THE TAMILNADU DR.M.G.R MEDICAL UNIVERSITY
CHENNAI -600032.

Comparative Clinical-Radiologic-Post mortem
Study of Diffuse Axonal Injury
in Severe Head Injury Patients

Dissertation submitted in partial fulfillment
of the requirements of

M.Ch BRANCH II NEUROSURGERY (3 YEARS)
EXAMINATIONS – AUGUST 2015

INSTITUTE OF NEUROSURGERY
MADRAS MEDICAL COLLEGE & GOVERNMENT GENERAL HOSPITAL
CHENNAI-600003.

August 2015

CERTIFICATE

This is to certify that this dissertation entitled **"Comparative Clinical-Radiologic - Post mortem Study of Diffuse Axonal Injury in Severe Head Injury Patients"** submitted by **Dr.S.Palanisamy**, appearing for **M.Ch. (Neurosurgery) (3 years)** degree examination in August 2015 is a original bonafide record of work done from October 2012 to March 2015 by him under my guidance and supervision in partial fulfillment of requirement of the Tamil Nadu Dr.M.G.R. Medical University, Chennai. I forward this dissertation to the Tamil Nadu Dr.M.G.R. Medical University, Chennai, Tamil Nadu, India.

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CERTIFICATE FROM GUIDE

This is to certify that this dissertation entitled **"Comparative Clinical-Radiologic-Post mortem Study of Diffuse Axonal Injury in Severe Head Injury Patients"** submitted by **Dr.S.Palanisamy**, appearing for **M.Ch. (Neurosurgery) (3 years)** degree examination is a original bonafide record of work by him under my guidance and supervision in partial fulfillment of requirement of the Tamil Nadu Dr.M.G.R. Medical University, Chennai done for the academic year August 2012 to August 2015. I recommend this dissertation to the Tamil Nadu Dr.M.G.R. Medical University, Chennai, Tamil Nadu, India.

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DECLARATION

I, Dr.S.Palanisamy, solemnly declare that this dissertation **"Comparative Clinical - Radiologic-Post mortem Study of Diffuse Axonal Injury in Severe Head Injury Patients"** was done by me at the Department of Neurosurgery, Institute of Neurosurgery, Madras Medical College & Rajiv Gandhi Government General Hospital, Chennai - 600003 under the guidance and supervision of the Director of Neurosurgery, Institute of Neurosurgery, Madras Medical College & Rajiv Gandhi Government General Hospital, Chennai - 600003 between October 2012 and March 2015.

This dissertation is submitted to the Tamil Nadu Dr.M.G.R. Medical University, Chennai-600032 in partial fulfillment of the University requirements for the award of the degree of M.Ch. in Neurosurgery.

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INTRODUCTION

INTRODUCTION

The adage that the dead teach the living cannot be truer than in severe head injury. Most of the severely head injured patients, even with the best of treatments end up with high morbidity and mortality and frequently end up in the Forensic Department.

This study was taken up to analyse the Glasgow Coma Scale, Clinical Signs, Radiological Findings, Gross and Microscopic postmortem findings in death as the result of diffuse closed head trauma sustained from high-speed automobile accidents which presents as difficult and challenging to task for the treating Neurosurgeon.

The long-term consequences from such diffuse inner cerebral trauma are still poorly defined. The diffuse degeneration of cerebral white matter is associated with sagittal and lateral acceleration with centroaxial trauma and has a different pathogenesis from outer focal head trauma, typified by subdural hematomas and coup injuries.

Unlike outer cerebral injury, over 50 percent of victims with diffuse axonal injury[1] die within two weeks. These individuals characteristically have no lucid interval and remain unconscious, vegetative, or severely disabled until death.

Compared to head trauma victims without diffuse axonal injury[2], there is a lower incidence of skull fractures[3], subdural hemorrhages, or other intracranial mass effect as well as outer brain contusions.

Primary brainstem injuries often demonstrated at autopsy are seen in the reported cases. Diffuse axonal injury is produced by various angles of acceleration with prolonged acceleration/deceleration -usually accompanying traffic accidents. Less severe diffuse axonal injury causes concussion.

Hence this was formulated to analyze in detail the clinical, radiological and gross & histological autopsy features of Diffuse Axonal Injury in severe head injury patients.

AIMS

AND

OBJECTIVES

AIMS & OBJECTIVES OF THE STUDY

To analyze the clinical, radiological and gross & histological autopsy features of Diffuse Axonal Injury in severe head injury patients.

REVIEW

OF

LITERATURE

REVIEW OF LITERATURE

Head Injury is one of the leading causes of disability and death in Middle Ages in Head Injury and in our country[4], about fifty thousand people loose their lives and another 80000 are disabled because of Traumatic Brain Injury

Head injury[5] involves young people in their productive part of their life. Loss of life and rehabilitation of severely disability victims costs a lot of money and incurs a significant economic burden to the country. One of the WHO report mentioned 3.5 million deaths all over the world in a year, due to injury, among them 700,000 were due to road accidents. The same report mentioned, 1.5 million people required medical care. Nakajima et al, reported 5000 billion US dollars being the medical bills and rehabilitation cost. This is a tremendous financial loss due to accidents.

In India another developing country increasing accidents not only results in loss of young life, but also damage to the family and financial burden currently number of deaths due to the road accidents in India over 60,000 and large number of deaths do occur due to various other injuries. Ramamurthy quoted Rs 350 cores financial loss per year, due to accidents. Presently, the figure most is higher.

In India, the incidence of head injury is steadily increasing with urbanization and increasing number of vehicular population, Among the road traffic accidents 70% have head injury, among road accidents deaths 70 % are due head injury .Majority of deaths occur during the first 72 hours.

Recently the number of fatal accidents have increased in India. Total number of vehicles in India are only 1% of world's total vehicles, however, total number of accidents in India as reported in 1991 were 6% of total accidents, thus making it highest incidence of accidents rate in the world. Currently annual road accidents in India are over 600,000. Every minute there is an accident and every eighth minute there is a death. In 1987 New York Times reported that fatality rate in India for 10,000 vehicles is 55, which was at that time reported to be the highest in the world.

The incidence in Delhi has steadily increased. Indian statistics as reported over 22 years from 1970 to 1992, showed unacceptably high accidents and deaths. Baker et al 1986 reported over 8% of total deaths in US was due to injury

Parameters	1970	1980	1990
1. Number of accidents	114	153	282
2. Number injured	70	109	224
3. Number of accidents per 1000 vehicle	80.3	33.8	54
4. Number of died	14	24	54
5. Total number of vehicles	140	451	19177

Number of accidents and deaths per 1000 vehicles in various countries		
Country	Accidents per 1000 vehicles in various countries	Death per 1000 vehicles
1.Australia	3.1	0.39
2.Brazil	1.3	0.34
3.France	8.7	0.40
4.Japan	9.8	0.20
5.UK	14.0	0.52
6.USA	12.2	0.25
7. India	31.8	2.5

Incidence of head injury in different age groups in India	
Age group	% of all head injury
Children below 20 years	30
Young adults 20-40 years	60
Elderly above 60 years	5

Outcome prediction after catastrophic injury like Traumatic Brain Injury is of significant research interest[6,7] as well as to plan the short and long term patient management. Diffuse Axonal Injury[8] is an important pathological substrate of Traumatic Brain Injury. Better accuracy in predicting outcome in Diffuse Axonal injury, is important for better management of such injuries and for better financial planning.

MATERIALS

AND

METHODS

MATERIALS AND METHODS

The study was done by Dr. S.Palanisamy at Institute of Neurosurgery, Madras Medical College & Rajiv Gandhi Government General Hospital, Chennai – 600003 between October 2012 to March 2015.

STUDY DESIGN:

Prospective Cross-sectional Study

PLACE OF STUDY:

Institute of Neurosurgery, Madras Medical College & Government General Hospital (MMC & GGH).

DURATION OF STUDY:

October 2012 to March 2015

NUMBER OF PATIENTS:

32

INCLUSION CRITERIA:

1. All patients admitted to the neurosurgical ward of the Institute of Neurosurgery, Madras Medical College & RGGGH with Severe Head injury (GCS<8) and CT scan brain suggestive of Diffuse Axonal Injury were be included in the study.

EXCLUSION CRITERIA:

1. Patients who had severe parenchymal injuries.
2. Patients who had extra axial and intra axial hematomas.
3. Patients who had multiple injuries (solid organs and long bone fractures).
4. Patients who were not willing to take part in the study.

MRI Brain was not done in the study.

METHODOLOGY:

The patients who were admitted to the neurosurgical ward with Severe Head Injury (GCS<8) and a CT scan brain suggestive of diffuse axonal injury were included in the study.

The demographic data was collected and the radiologic features were analyzed. The patients who died during the course of treatment were included in the study and the autopsy was done to study the features of diffuse injury in the brain.

In our institution, during the study period, average about 50 patients per day get admitted in Trauma Ward Following Injury from RTA, fall, assault and industrial accidents etc.

Of which on an average, 12 had head injury

Of this 12, we found that 2 patients sustained Severe Head Injury (GCS<8) & Diffuse Axonal Injury.

Of this, one patient sustained moderate to severe DAI

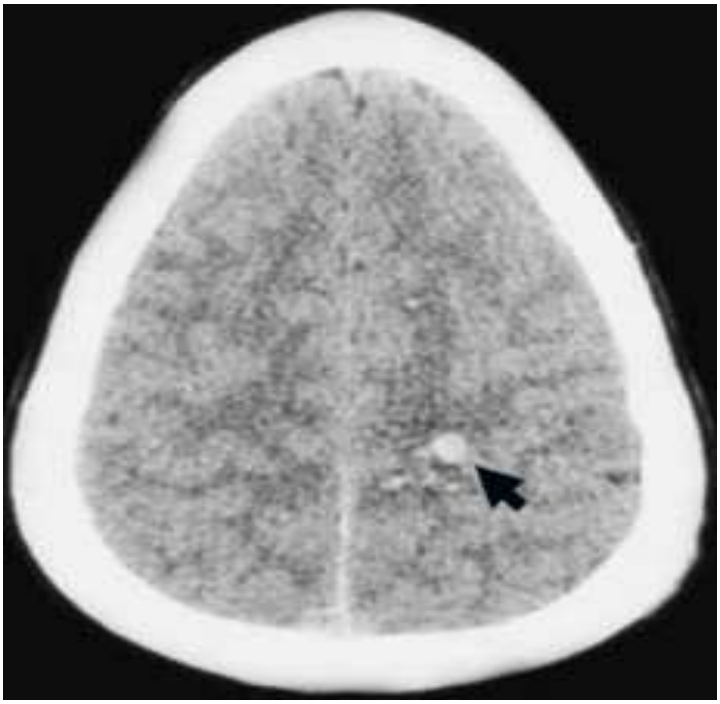
In our study 90 patients sustained DAI, of whom 32 patients expired and were subjected to autopsy and findings were analysed.

Category	Definition
Diffuse Injury I	no visible intracranial abnormality
Diffuse Injury II	basal cisterns* present, 0-5 mm midline shift and/or lesion densities present
Diffuse Injury III	basal cisterns* compressed or absent, 0-5 mm midline shift, no high or mixed density lesion > 25 cc
Diffuse Injury IV	midline shift > 5 mm, no high or mixed density lesion > 25 cc

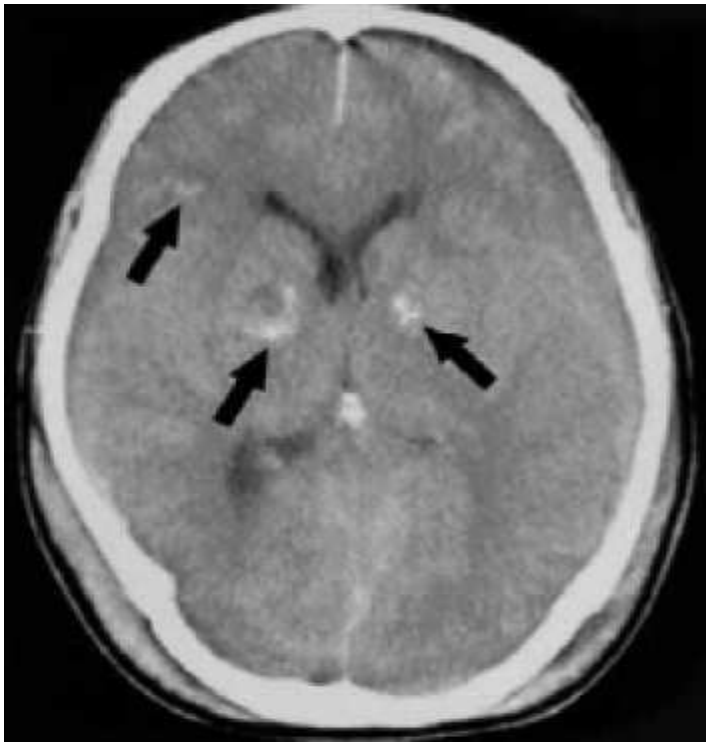
DIFFUSE AXONAL INJURY

PROLONGED TRAUMATIC COMA WITHOUT MASS

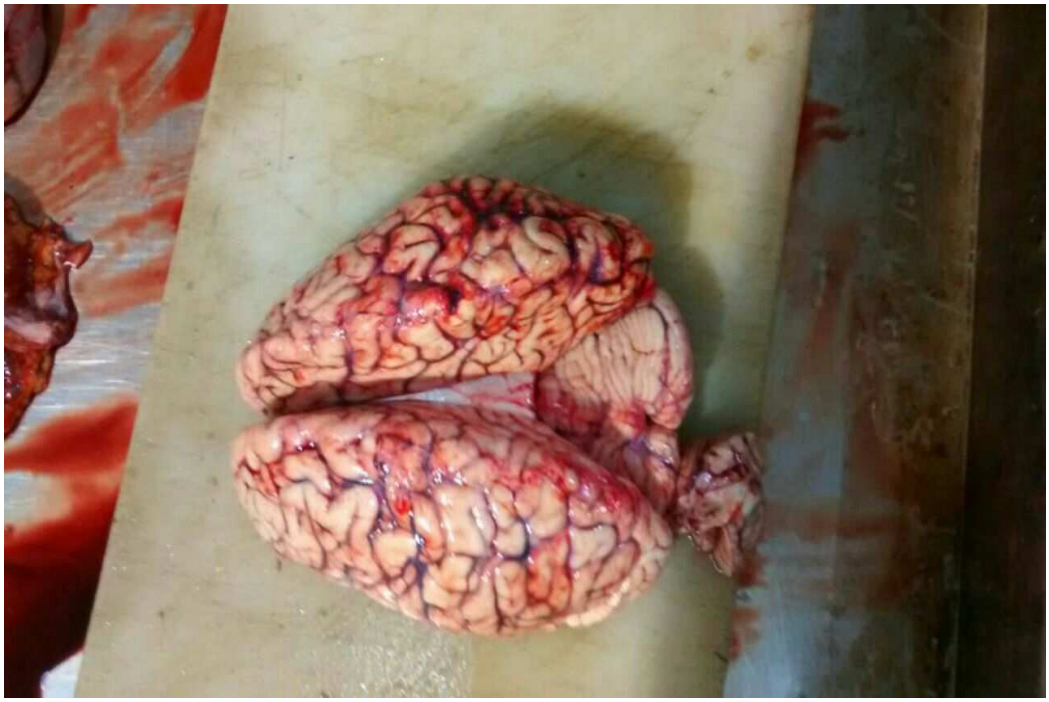
- CLINICAL GRADES:
  - MILD: COMA 6-24 HOURS
  - MODERATE: COMA >24 HRS, NO BRAIN STEM SIGNS
  - SEVERE: COMA >24 HRS WITH BRAIN STEM SIGNS:



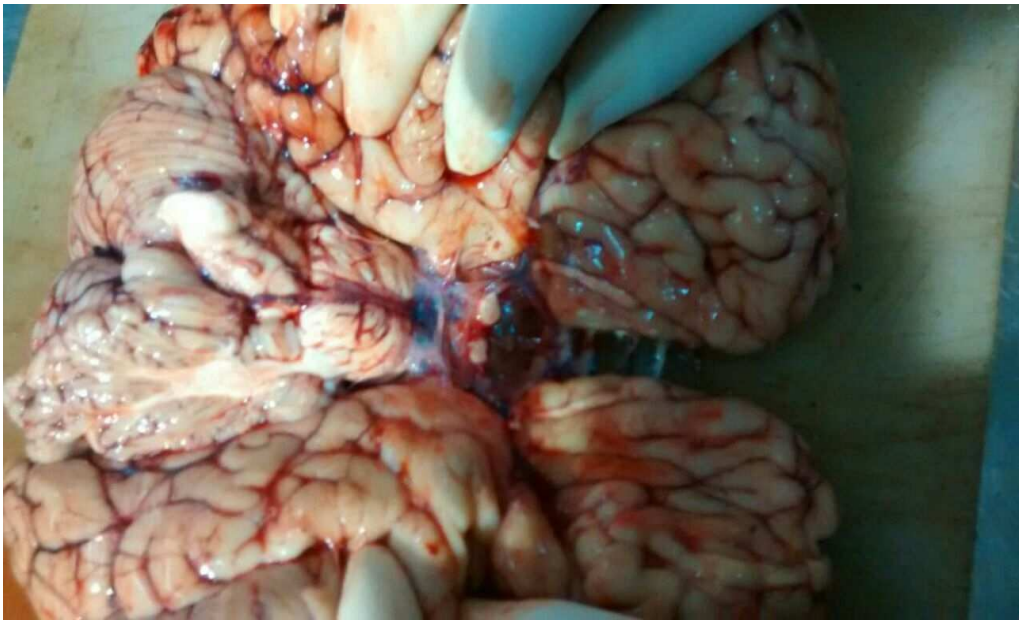
CT Brain with sub cortical contusion



CT Brain with subcortical & thalamic contusions



Gross Specimen With SAH

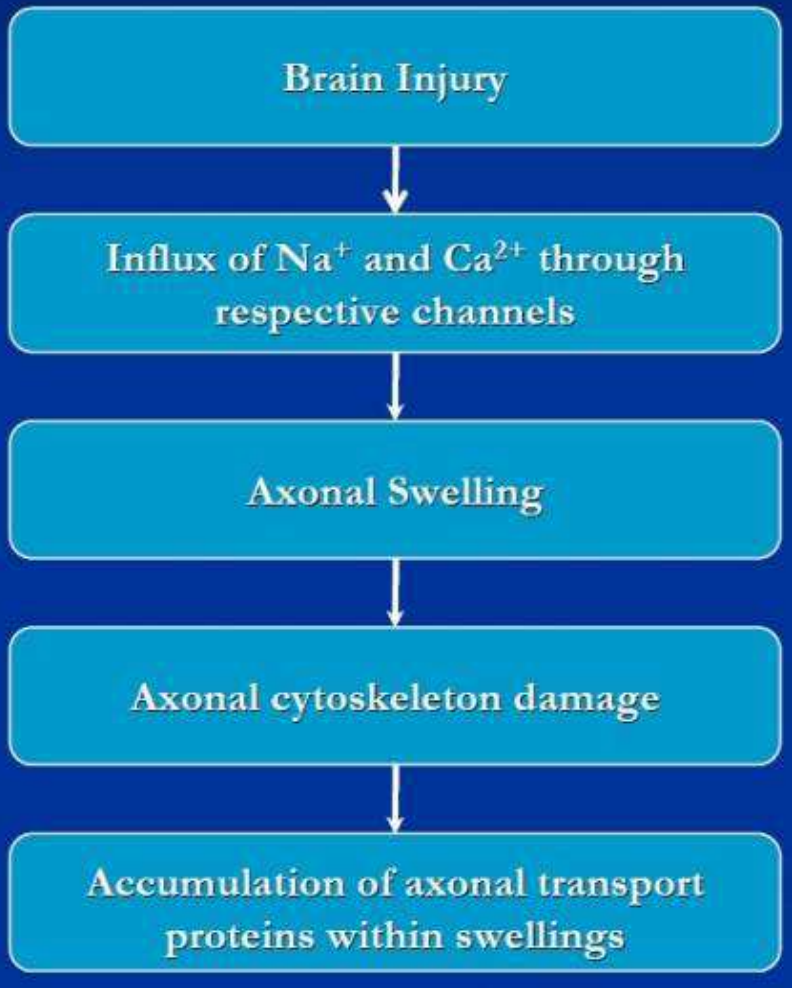


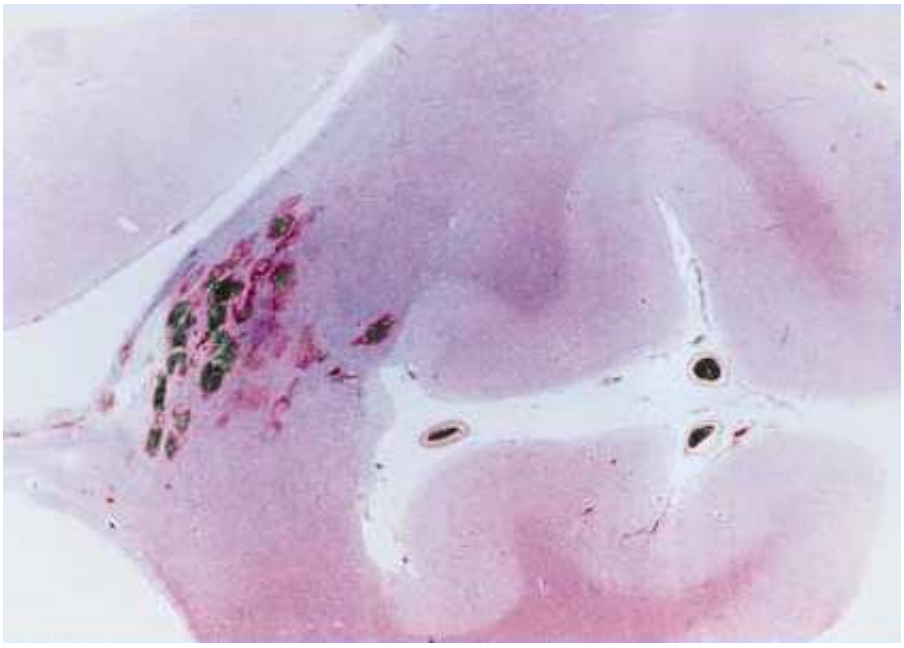
Brain Stem Cisternal Bleed

Brain Stem Contusion

Midbrain Petechial Haemorrage

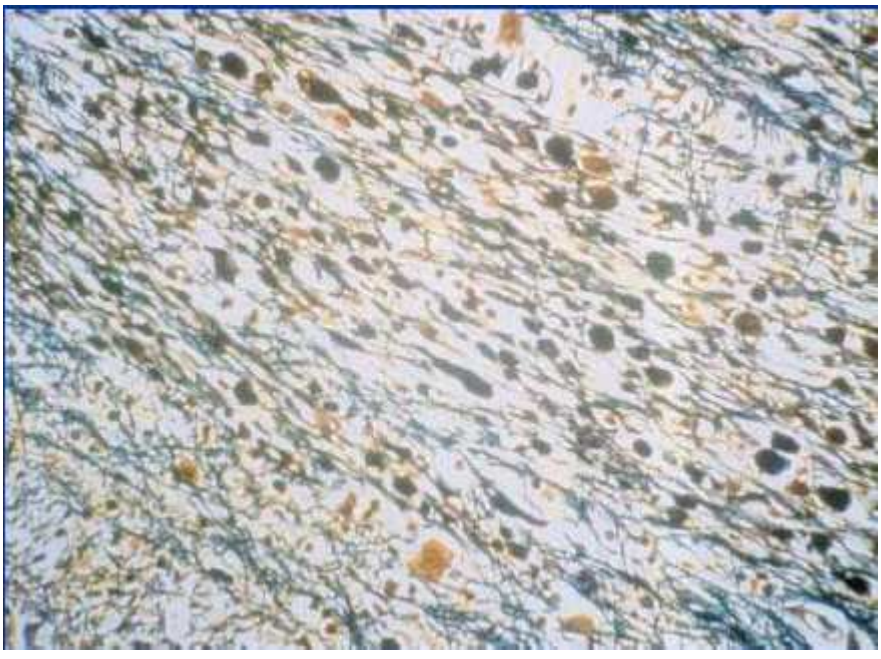
- Increased cytoskeleton damage + protein accumulation = axon disconnection
- Axon disconnection leads to irreversible damage
- Pathologic Feature: Bulb formation





Low power Hematoxylin eosin stain demonstrating DAI &

Petechial haemorrage



Silver stain indicating Axonal terminal bulbs

OBSERVATIONS

AND

RESULTS

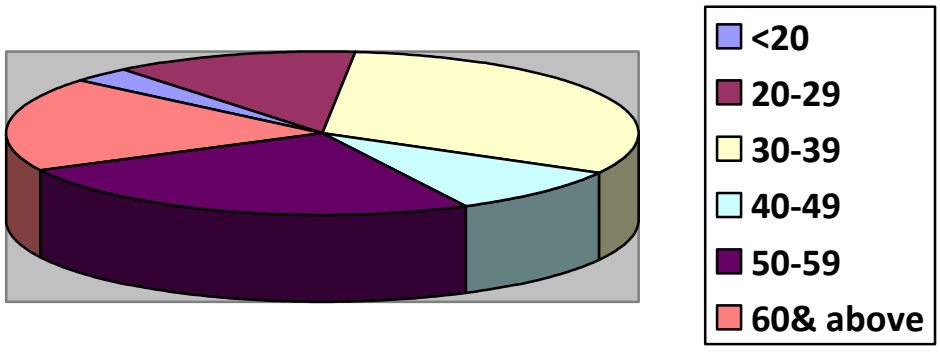
OBSERVATIONS AND RESULTS

The overall results of this study are shown below.

AGE

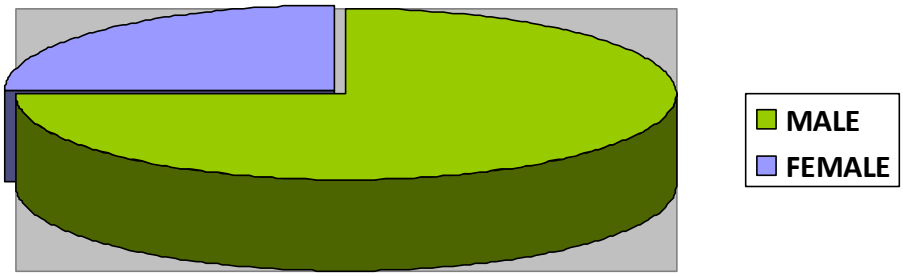
The Minimum Age of the patient was 18 and the Maximum Age of the patient was 85 in this study. The Mean was 43years.

Age	No
<20	1
20-29	4
30-39	10
40-49	3
50-59	8
60& above	6
	32



SEX

	Frequency	Percent
Male	24	75.0
Female	8	25.0
Total	**32**	**100.0**



LOSS OF CONSCIOUSNESS

All the patients in our study were associated with LOC.

SEIZURES

In our study 17 out of 32 patients had seizure, of them 10 patients had seizure on the day of injury.

	Frequency	**Percent**
seizure	17	53.1
Without seizure	15	46.9
Total	**32**	**100.0**

VOMITING

In this study 14 patients had vomiting.

	Frequency	Percent
Present	14	43.8
Absent	18	56.3
Total	**32**	**100.0**

ENT BLEED

In this study 10 patients had ENT bleed.

	Frequency	Percent
Present	10	31.3
Absent	22	68.8
Total	**32**	**100.0**

Glasgow Coma Scale (GCS)

All the patients in our study were unconscious, the average GCS was less than 6

There were 8 patients in GCS 3, 9 patients in GCS 4, 10 patients in GCS 5, 5 Patients with GCS 6

GCS

GCS	Frequency	Percent
3	8	25.0
4	9	28.1
5	10	31.3
6	5	15.6
Total	**32**	**100.0**

In this study patients with GCS less than 5 died. (84.4 %)

EYE OPENING

Score	Frequency	Percent
1	29	90.6
2	3	9.4
Total	**32**	**100.0**

VERBAL RESPONSE

	Frequency	Percent
ET	**32**	**100.0**

MOTOR RESPONSE

	Frequency	Percent
1	8	25.0
2	9	28.1
3	13	40.6
4	2	6.3
Total	**32**	**100.0**

PUPIL SIZE

Pupil Size	Frequency	Percent
3.0	18	56.3
3.5	4	12.5
4.0	10	31.3
Total	**32**	**100.0**

PUPILLARY REFLEX

Pupillary Reflex	Frequency	Percent
Present	7	21.9
Absent	25	78.1
Total	**32**	**100.0**

DEM

DEM	Frequency	Percent
Present	7	21.9
Absent	25	78.1
Total	32	100.0

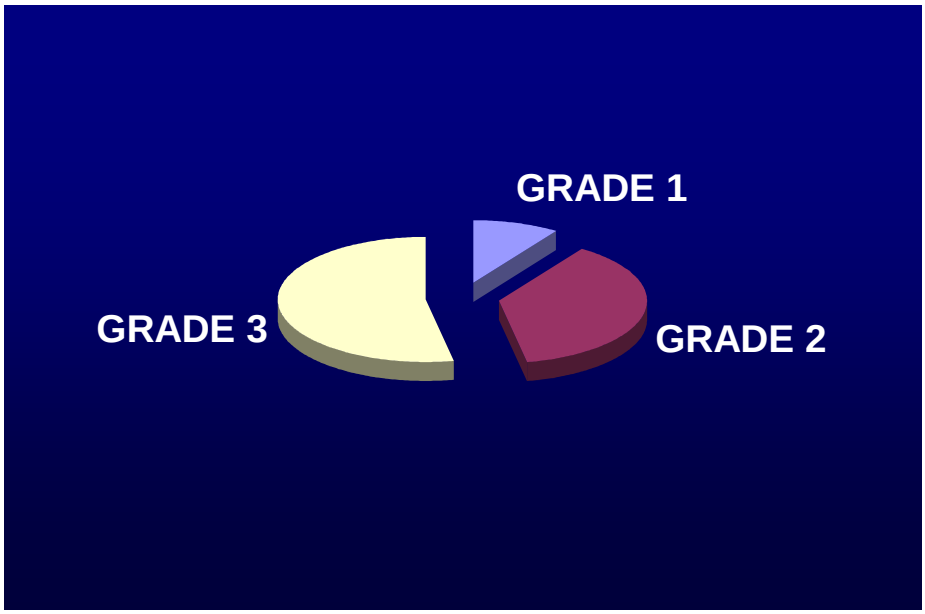
Clinical Grade

More number of Patients with clinical grading 3 –died, 17 out of 32 (53.1%)

DAI grade	Description
mild	coma > 6-24 hrs, followed by mild-to-moderate memory impairment, mild-to-moderate disabilities
moder-ate	coma > 24 hrs, followed by confu-sion & long-lasting amnesia. Mild-to-severe memory, behavior-al and cognitive deficits
severe	coma lasting months with flexor and extensor posturing. Cogni-tive, memory, speech, sensorimo-tor and personality deficits. Dysautonomia may occur

CLINICAL GRADING

Clinical Grading	Frequency	Percent
1	3	9.4
2	12	37.5
3	17	53.1
Total	**32**	**100.0**

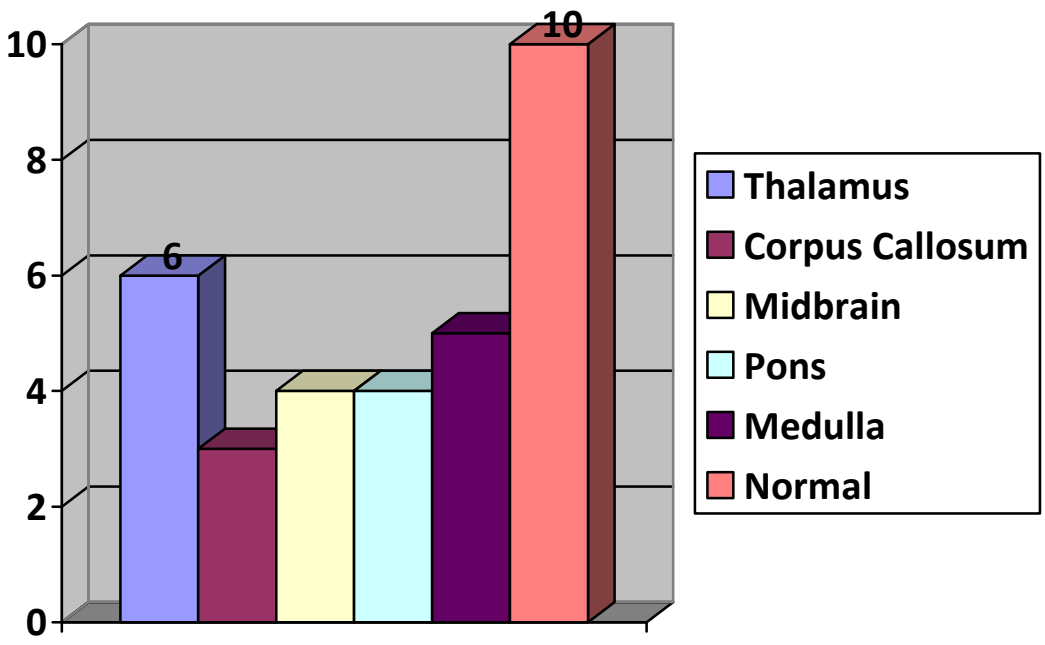


CT BRAIN GRADING

In this study, CT brain was normal in 10 patients out of 32. In 6 patients(18.8%) lesions were found in thalamus.

In Wadate et al study CT brain was normal in 16% of patients.

In our study it was 31.25%.



Lesions in Thalamus	**6**
Lesions in Midbrain	**4**
Lesions in Pons	**4**
Lesions in Medulla	**5**
Lesions in Corpus Callosum	**3**
No Lesions in CT Brain	**10**

	Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
1	20	62.5	62.5	62.5
2	12	37.5	37.5	100.0
Total	32	100.0	100.0	

CT : Lesions in Thalamus

	Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Lesion	6	18.8	18.8	18.8
No Lesion	26	81.3	81.3	100.0
Total	32	100.0	100.0	

CT: Lesions in Corpus Callosum

	Frequency	Percent	Valid Percent	Cumulative Percent
Lesion	3	9.4	9.4	9.4
No Lesion	29	90.6	90.6	100.0
Total	32	100.0	100.0	

CT: Lesions in Midbrain

	Frequency	Percent	Valid Percent	Cumulative Percent
Lesion	4	12.5	12.5	12.5
No Lesion	28	87.5	87.5	100.0
Total	32	100.0	100.0	

CT: Lesions in Pons

	Frequency	Percent	Valid Percent	Cumulative Percent
Lesion	4	12.5	12.5	12.5
No Lesion	28	87.5	87.5	100.0
Total	32	100.0	100.0	

CT: Lesions in Medulla

	Frequency	Percent	Valid Percent	Cumulative Percent
Lesion	5	15.6	15.6	15.6
No Lesion	27	84.4	84.4	100.0
Total	32	100.0	100.0	

DISCUSSION

DISCUSSION

In this study, though CT brain was normal in most of the cases, autopsy revealed lesions in various locations of the brain which were pathagnomic.

Gross Findings in Autopsy

SAH was the commonest finding - in 20 patients out of 32 (62.5%) which correlates with Wadate et al study.(64%)

1.	SAH – 20 cases
2.	Contused Brain
3.	Contused Brain with Hemorrhagic Spots
4.	Diffuse Punctate Haemorrhagic Spots
5.	Left Frontal Thin SDH
6.	Left Sylvian Region ICH
7.	Left Ventricular IVH
8.	Right Frontal ICH
9.	Right Sylvian Region ICH
10.	Right Temporal ICH
11.	Right Thalamic ICH
12.	Small Bifrontal Contusion

	Frequency	Percent	Valid Percent	Cumulative Percent
Contused Brain	1	3.1	3.1	3.1
Contused Brain with Hemorrhagic Spots	1	3.1	3.1	6.3
Diffuse Punctate Haemorrhagic Spots	1	3.1	3.1	9.4
Left Frontal Thin SDH	1	3.1	3.1	12.5
Left Sylvian Bleed	1	3.1	3.1	15.6
Left Ventricular IVH	1	3.1	3.1	18.8
Right Frontal ICH	1	3.1	3.1	21.9
Right Sylvian bleed	1	3.1	3.1	25.0
Right Temporal ICH	1	3.1	3.1	28.1
Right Thalamic ICH	1	3.1	3.1	31.3
Small Bifrontal Contusion	2	6.3	6.3	37.5
SAH	20	62.5	62.5	100.0
Total	32	100.0	100.0	

MICROSCOPIC FINDINGS IN AUTOPSY

On microscopic examination Hypoxic Changes with cellular swelling, Microhemorrages, White Matter Degeneration, Axonal swelling were found.

Among them Hypoxic Changes with cellular swelling were the commonest finding. In Parker et al study autopsy microscopic findings were mostly diffuse degeneration of cerebral white matter, but in our study Hypoxic Changes with cellular swelling were the common findings.

Microscopic Findings in Autopsy: Lesions in Thalamus

Microscopic Findings	Frequency	Percent	Valid Percent	Cumulative Percent
Hypoxic Changes	22	68.8	68.8	68.8
Microhemorrages	10	31.3	31.3	100.0
Total	32	100.0	100.0	

Microscopic Findings in Autopsy: Lesions in Corpus Callosum

	Frequency	Percent	Valid Percent	Cumulative Percent
Hypoxic Changes	16	50.0	50.0	50.0
Microhemorrages	14	43.8	43.8	93.8
White Matter Degeneration	2	6.3	6.3	100.0
Total	32	100.0	100.0	

Microscopic Findings in Autopsy: Lesions in Midbrain

	Frequency	Percent	Valid Percent	Cumulative Percent
Hypoxic Changes	19	59.4	59.4	59.4
Microhemorrages	9	28.1	28.1	87.5
White Matter Degeneration	4	12.5	12.5	100.0
Total	32	100.0	100.0	

Microscopic Findings in Autopsy: Lesions in Pons

	Frequency	Percent	Valid Percent	Cumulative Percent
Hypoxic Changes	21	65.6	65.6	65.6
Microhemorrages	6	18.8	18.8	84.4
White Matter Degeneration	4	12.5	12.5	96.9
Axonal Retraction Balls	1	3.1	3.1	100.0
Total	32	100.0	100.0	

Microscopic Findings in Autopsy: Lesions in Medulla

	Frequency	Percent	Valid Percent	Cumulative Percent
Hypoxic Changes	22	68.8	68.8	68.8
Microhemorrages	5	15.6	15.6	84.4
White Matter Degeneration	4	12.5	12.5	96.9
Axonal Retraction Balls	1	3.1	3.1	100.0
Total	32	100.0	100.0	

CT : Lesions in Thalamus * Microscopic Findings in Autopsy - Lesions in Thalamus

			Microscopic Findings in Autopsy : Lesions in Thalamus			P value
			Hypoxic Changes	Microhemorrages	Total	
CT : Lesions in Thalamus	Lesion	Count	2	4	6	0.038*
		% within CT : Lesions in Thalamus	33.3%	66.7%	100.0%	
		% within Microscopic Findings in Autopsy : Lesions in Thalamus	9.1%	40.0%	18.8%	
	No Lesion	Count	20	6	26	
		% within CT : Lesions in Thalamus	76.9%	23.1%	100.0%	
		% within Microscopic Findings in Autopsy : Lesions in Thalamus	90.9%	60.0%	81.3%	
Total		Count	22	10	32	
		% within CT : Lesions in Thalamus	68.8%	31.3%	100.0%	
		% within Microscopic Findings in Autopsy : Lesions in Thalamus	100.0%	100.0%	100.0%	

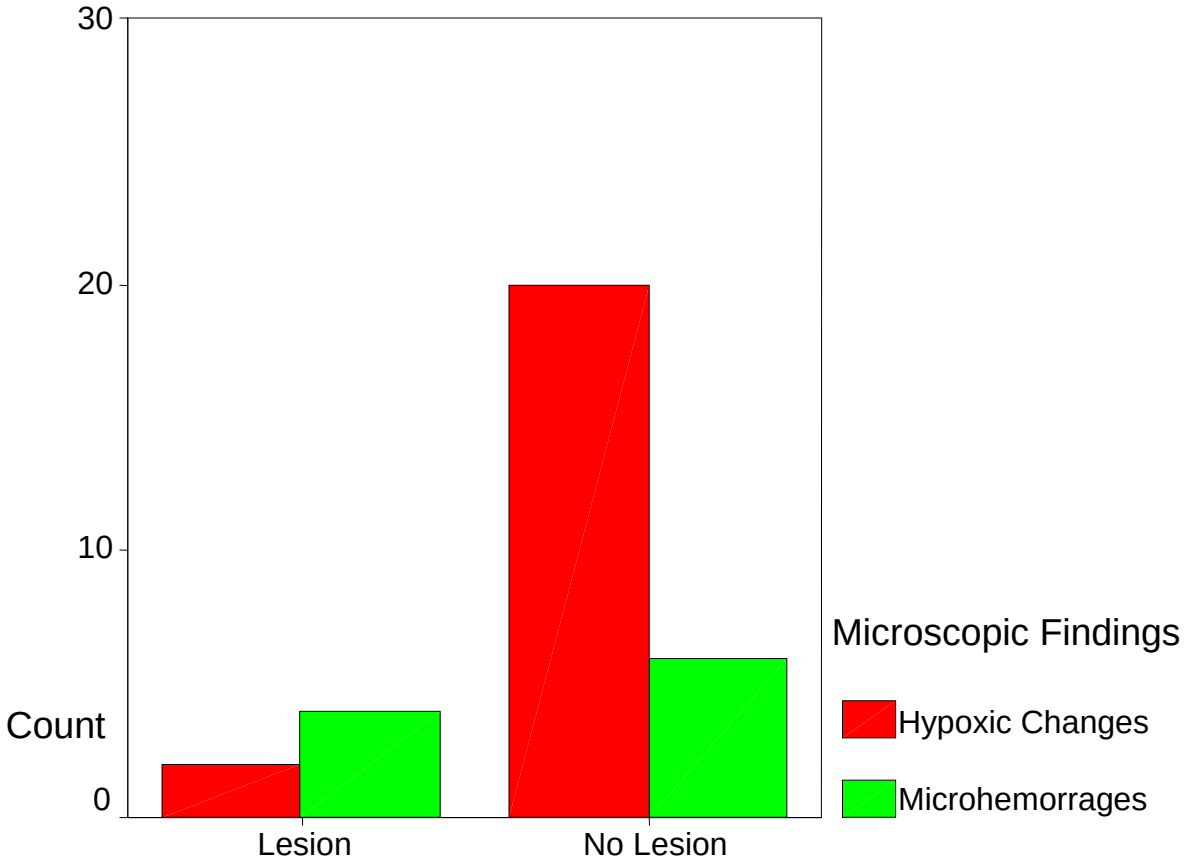
Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	4.311(b)	1	**.038**		
Continuity Correction(a)	2.521	1	.112		
Likelihood Ratio	4.021	1	.045		
Fisher's Exact Test				.060	.060
Linear-by-Linear Association	4.177	1	.041		
N of Valid Cases	32				

(a) Computed only for a 2x2 table

(b) 2 cells (50.0%) have expected count less than 5. The minimum expected count is 1.88.

By using **Chi-Square Test P value = 0.038 (P<0.05),** it was observed that microscopic Lesions in Thalamus was statistically significant compared with other CT brain lesions



CT : Lesions in Thalamus

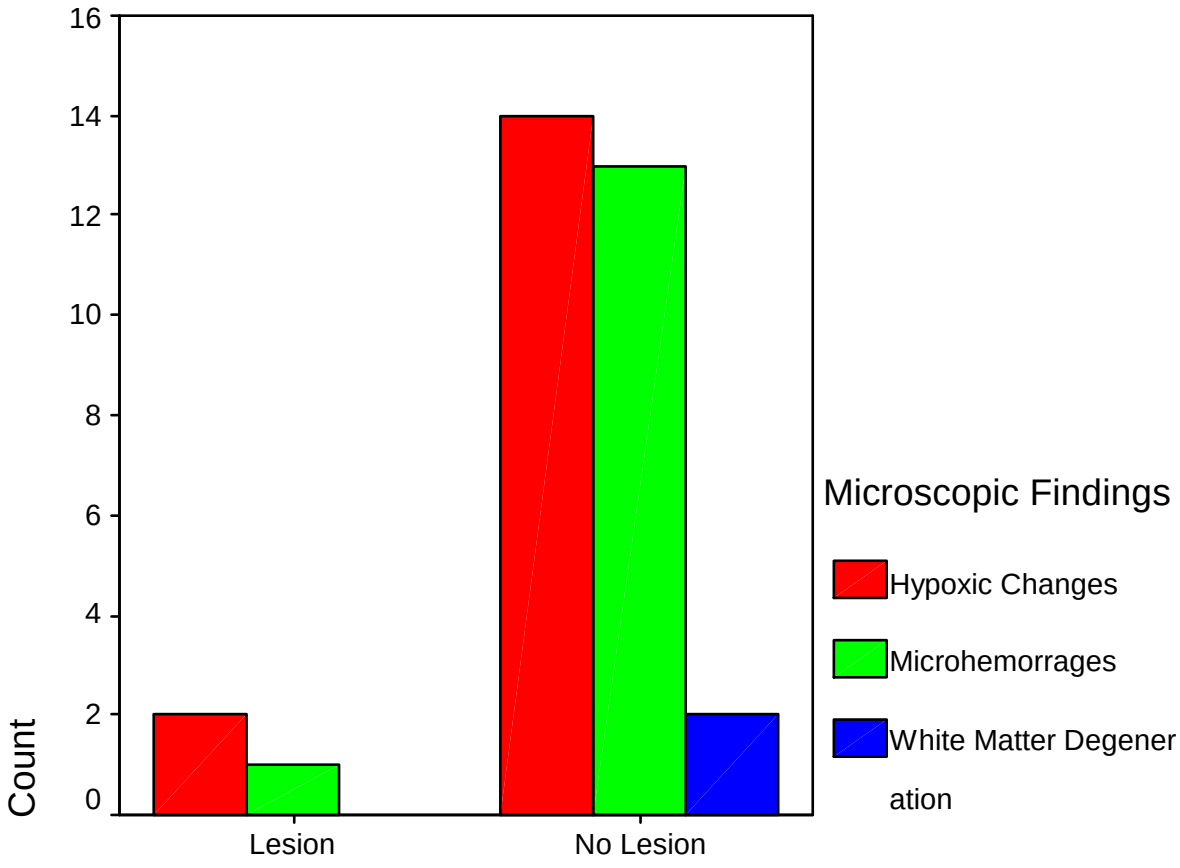
CT : Lesions in Corpus Callosum * Microscopic Findings in Autopsy : Lesions in Corpus Callosum

			Microscopic Findings in Autopsy : Lesions in Corpus Callosum			
			Hypoxic Changes	Microhemorrages	White Matter Degeneration	Total
CT : Lesions in Corpus Callosum	Lesion	Count	2	1	0	3
		% within CT : Lesions in Corpus Callosum	66.7%	33.3%	.0%	100.0%
		% within Microscopic Findings in Autopsy : Lesions in Corpus Callosum	12.5%	7.1%	.0%	9.4%
	No Lesion	Count	14	13	2	29
		% within CT : Lesions in Corpus Callosum	48.3%	44.8%	6.9%	100.0%
		% within Microscopic Findings in Autopsy : Lesions in Corpus Callosum	87.5%	92.9%	100.0%	90.6%
Total		Count	16	14	2	32
		% within CT : Lesions in Corpus Callosum	50.0%	43.8%	6.3%	100.0%
		% within Microscopic Findings in Autopsy : Lesions in Corpus Callosum	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	.473(a)	2	.789
Likelihood Ratio	.651	2	.722
Linear-by-Linear Association	.454	1	.501
N of Valid Cases	32		

(a) 4 cells (66.7%) have expected count less than 5. The minimum expected count is .19.



CT : Lesions in Corpus Callosum

CT : Lesions in Midbrain * Microscopic Findings in Autopsy : Lesions in Thalamus

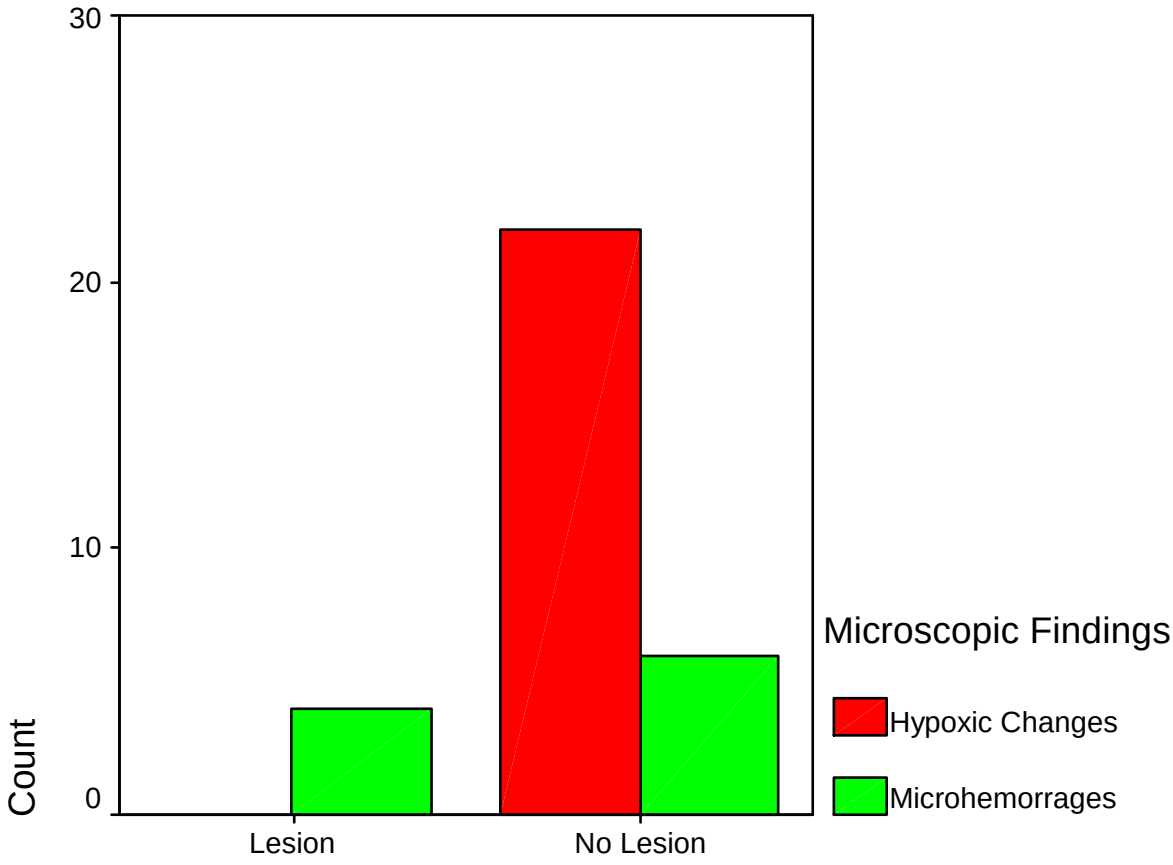
			Microscopic Findings in Autopsy : Lesions in Thalamus		Total
			Hypoxic Changes	Microhemorrages	
CT : Lesions in Midbrain	Lesion	Count	0	4	4
		% within CT : Lesions in Midbrain	.0%	100.0%	100.0%
		% within Microscopic Findings in Autopsy : Lesions in Thalamus	.0%	40.0%	12.5%
	No Lesion	Count	22	6	28
		% within CT : Lesions in Midbrain	78.6%	21.4%	100.0%
		% within Microscopic Findings in Autopsy : Lesions in Thalamus	100.0%	60.0%	87.5%
Total		Count	22	10	32
		% within CT : Lesions in Midbrain	68.8%	31.3%	100.0%
		% within Microscopic Findings in Autopsy : Lesions in Thalamus	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	10.057(b)	1	.002		
Continuity Correction(a)	6.732	1	.009		
Likelihood Ratio	10.653	1	.001		
Fisher's Exact Test				.006	.006
Linear-by-Linear Association	9.743	1	.002		
N of Valid Cases	32				

(a) Computed only for a 2x2 table

(b) 2 cells (50.0%) have expected count less than 5. The minimum expected count is 1.25.



CT : Lesions in Midbrain

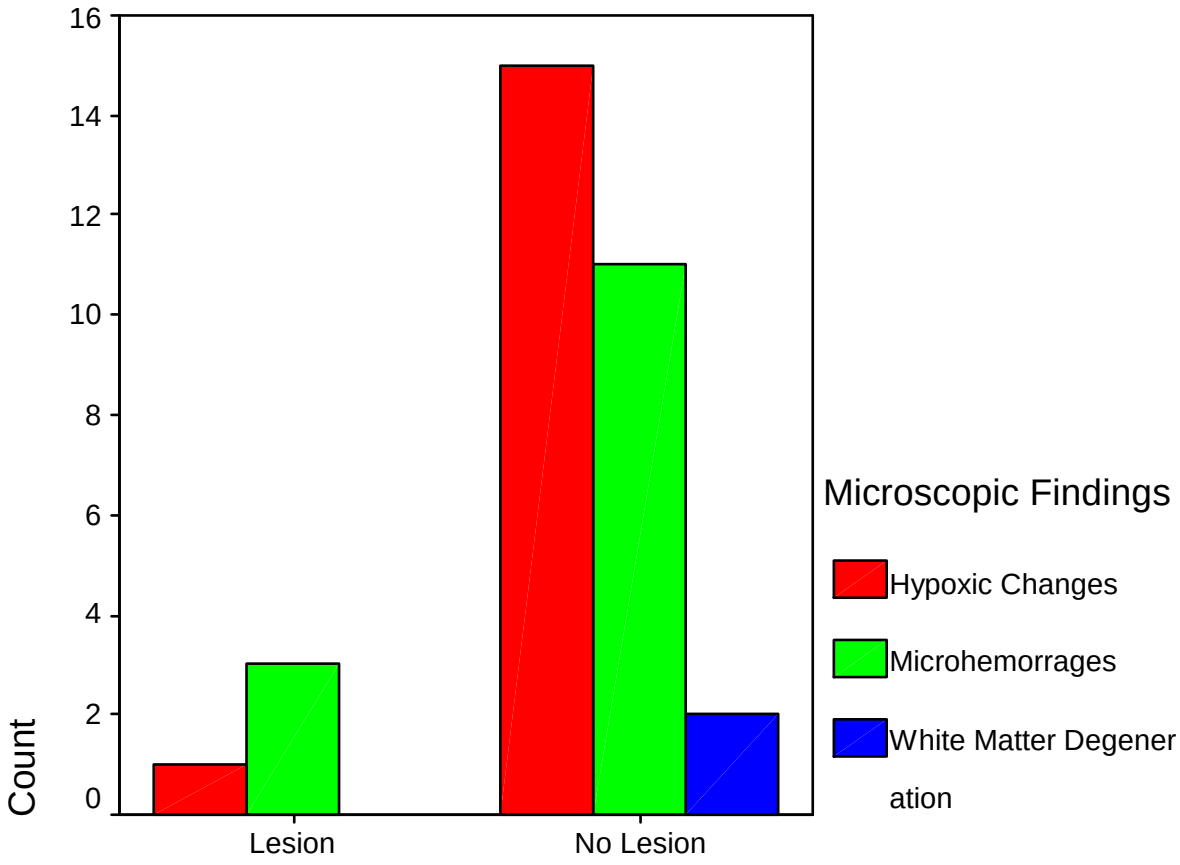
CT : Lesions in Midbrain * Microscopic Findings in Autopsy : Lesions in Corpus Callosum

			Microscopic Findings in Autopsy : Lesions in Corpus Callosum			
			Hypoxic Changes	Microhemorrages	White Matter Degeneration	Total
CT : Lesions in Midbrain	Lesion	Count	1	3	0	4
		% within CT : Lesions in Midbrain	25.0%	75.0%	.0%	100.0%
		% within Microscopic Findings in Autopsy : Lesions in Corpus Callosum	6.3%	21.4%	.0%	12.5%
	No Lesion	Count	15	11	2	28
		% within CT : Lesions in Midbrain	53.6%	39.3%	7.1%	100.0%
		% within Microscopic Findings in Autopsy : Lesions in Corpus Callosum	93.8%	78.6%	100.0%	87.5%
Total		Count	16	14	2	32
		% within CT : Lesions in Midbrain	50.0%	43.8%	6.3%	100.0%
		% within Microscopic Findings in Autopsy : Lesions in Corpus Callosum	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.878(a)	2	.391
Likelihood Ratio	2.084	2	.353
Linear-by-Linear Association	.420	1	.517
N of Valid Cases	32		

(a) 4 cells (66.7%) have expected count less than 5. The minimum expected count is .25.



CT : Lesions in Midbrain

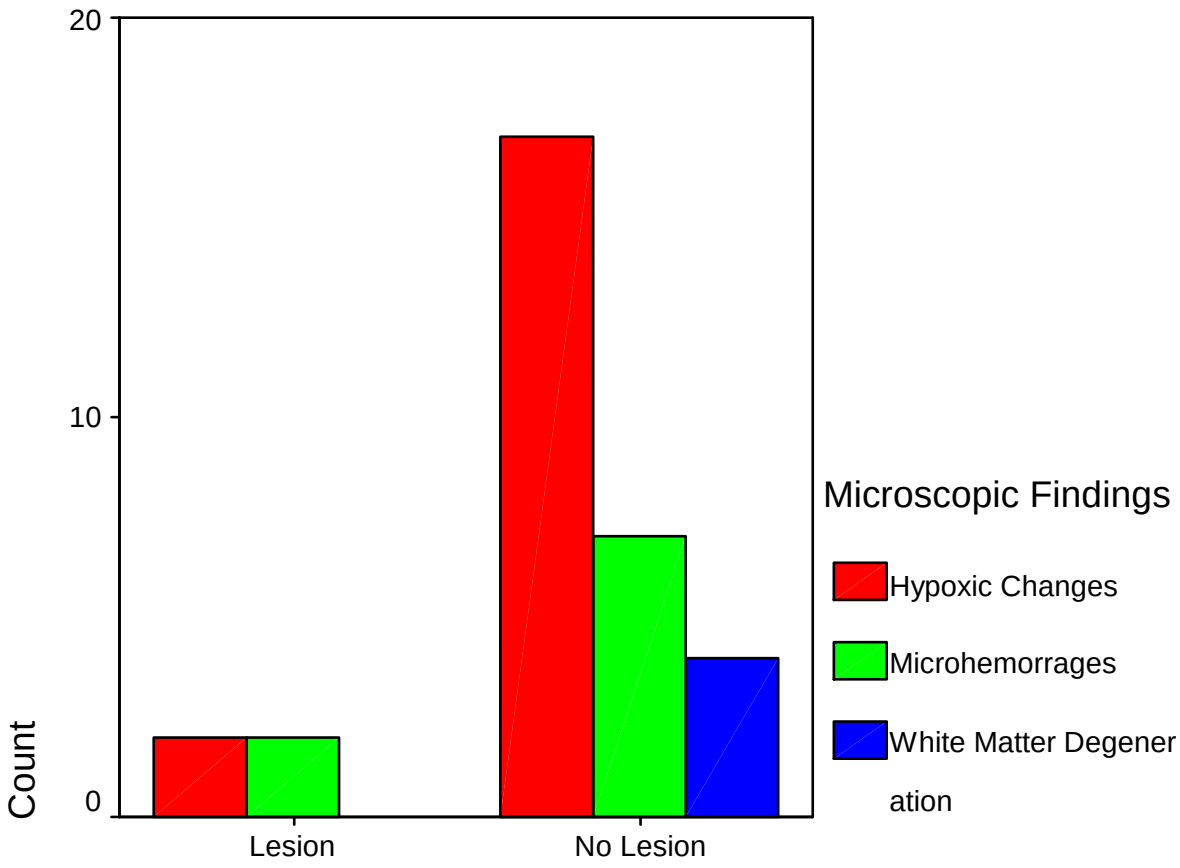
CT : Lesions in Midbrain * Microscopic Findings in Autopsy : Lesions in Midbrain

			Microscopic Findings in Autopsy : Lesions in Midbrain			
			Hypoxic Changes	Microhemorrages	White Matter Degeneration	Total
CT : Lesions in Midbrain	Lesion	Count	2	2	0	4
		% within CT : Lesions in Midbrain	50.0%	50.0%	.0%	100.0%
		% within Microscopic Findings in Autopsy : Lesions in Midbrain	10.5%	22.2%	.0%	12.5%
	No Lesion	Count	17	7	4	28
		% within CT : Lesions in Midbrain	60.7%	25.0%	14.3%	100.0%
		% within Microscopic Findings in Autopsy : Lesions in Midbrain	89.5%	77.8%	100.0%	87.5%
Total		Count	19	9	4	32
		% within CT : Lesions in Midbrain	59.4%	28.1%	12.5%	100.0%
		% within Microscopic Findings in Autopsy : Lesions in Midbrain	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.417(a)	2	.492
Likelihood Ratio	1.792	2	.408
Linear-by-Linear Association	.009	1	.926
N of Valid Cases	32		

(a) 4 cells (66.7%) have expected count less than 5. The minimum expected count is .50.



CT : Lesions in Midbrain

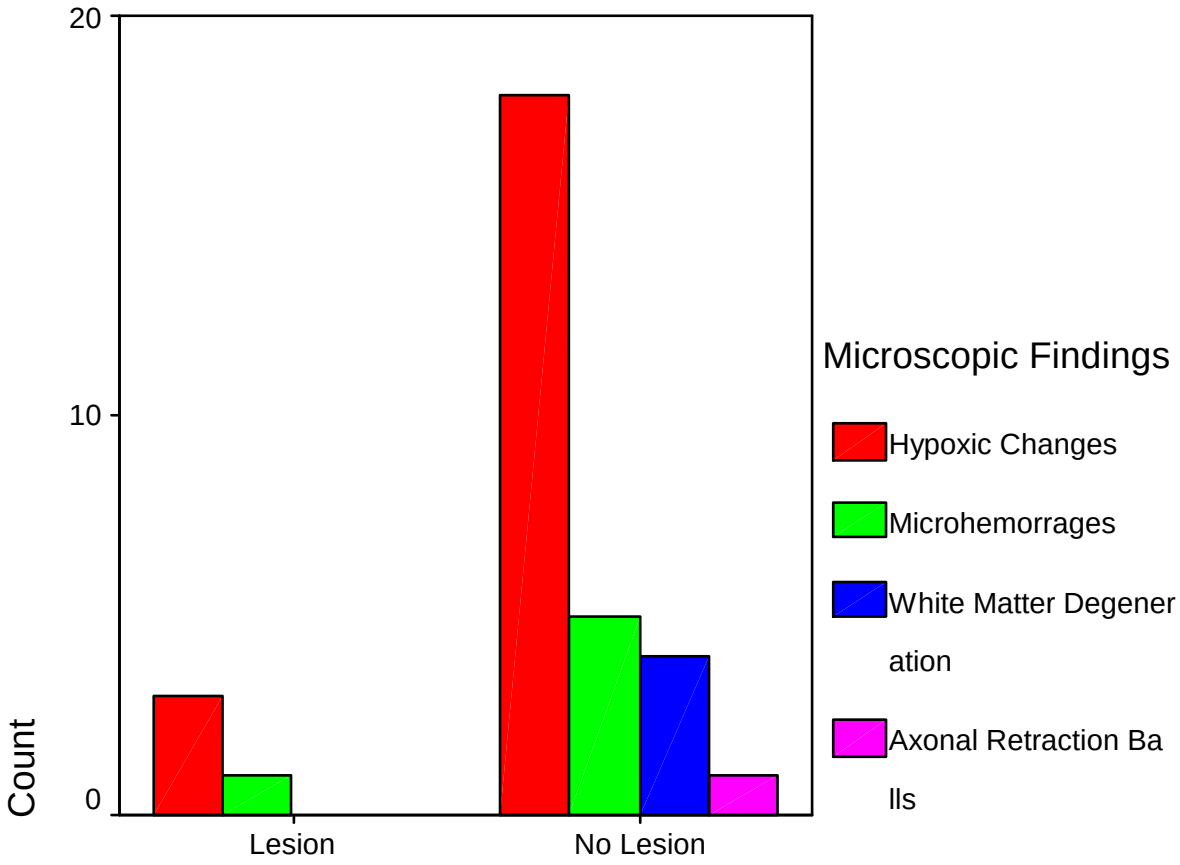
CT : Lesions in Midbrain * Microscopic Findings in Autopsy : Lesions in Pons

			Microscopic Findings in Autopsy : Lesions in Pons				Total
			Hypoxic Changes	Microhemorrages	White Matter Degeneration	Axonal Retraction Balls	
CT : Lesions in Midbrain	Lesion	Count	3	1	0	0	4
		% within CT : Lesions in Midbrain	75.0%	25.0%	.0%	.0%	100.0%
		% within Microscopic Findings in Autopsy : Lesions in Pons	14.3%	16.7%	.0%	.0%	12.5%
	No Lesion	Count	18	5	4	1	28
		% within CT : Lesions in Midbrain	64.3%	17.9%	14.3%	3.6%	100.0%
		% within Microscopic Findings in Autopsy : Lesions in Pons	85.7%	83.3%	100.0%	100.0%	87.5%
Total	Count		21	6	4	1	32
	% within CT : Lesions in Midbrain		65.6%	18.8%	12.5%	3.1%	100.0%
	% within Microscopic Findings in Autopsy : Lesions in Pons		100.0%	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	.871(a)	3	.832
Likelihood Ratio	1.482	3	.687
Linear-by-Linear Association	.510	1	.475
N of Valid Cases	32		

(a) 6 cells (75.0%) have expected count less than 5. The minimum expected count is .13.



CT : Lesions in Midbrain

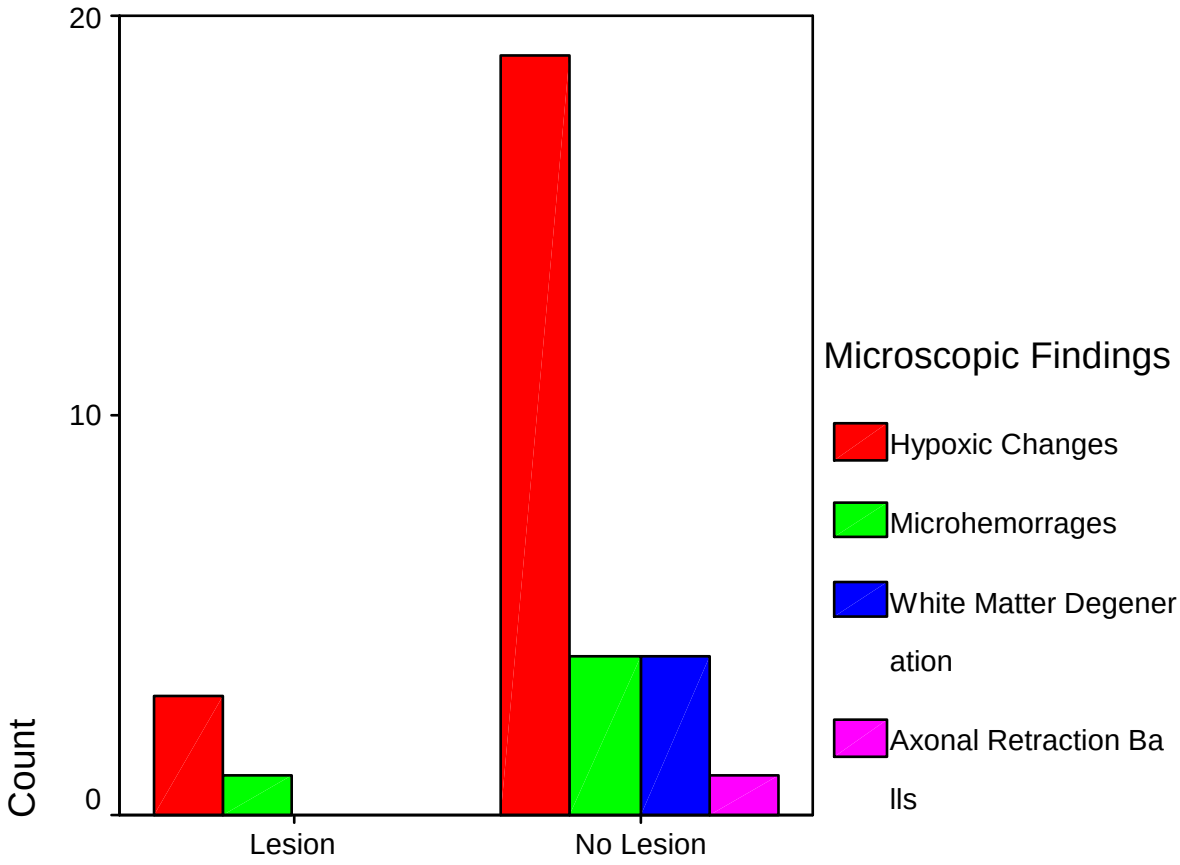
CT : Lesions in Midbrain * Microscopic Findings in Autopsy : Lesions in Medulla

			Microscopic Findings in Autopsy : Lesions in Medulla				Total
			Hypoxic Changes	Microhemorrages	White Matter Degeneration	Axonal Retraction Balls	
CT : Lesions in Midbrain	Lesion	Count	3	1	0	0	4
		% within CT : Lesions in Midbrain	75.0%	25.0%	.0%	.0%	100.0%
		% within Microscopic Findings in Autopsy : Lesions in Medulla	13.6%	20.0%	.0%	.0%	12.5%
	No Lesion	Count	19	4	4	1	28
		% within CT : Lesions in Midbrain	67.9%	14.3%	14.3%	3.6%	100.0%
		% within Microscopic Findings in Autopsy : Lesions in Medulla	86.4%	80.0%	100.0%	100.0%	87.5%
Total		Count	22	5	4	1	32
		% within CT : Lesions in Midbrain	68.8%	15.6%	12.5%	3.1%	100.0%
		% within Microscopic Findings in Autopsy : Lesions in Medulla	100.0%	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	.997(a)	3	.802
Likelihood Ratio	1.584	3	.663
Linear-by-Linear Association	.403	1	.526
N of Valid Cases	32		

(a) 7 cells (87.5%) have expected count less than 5. The minimum expected count is .13.



CT : Lesions in Midbrain

CT : Lesions in Pons * Microscopic Findings in Autopsy : Lesions in Thalamus

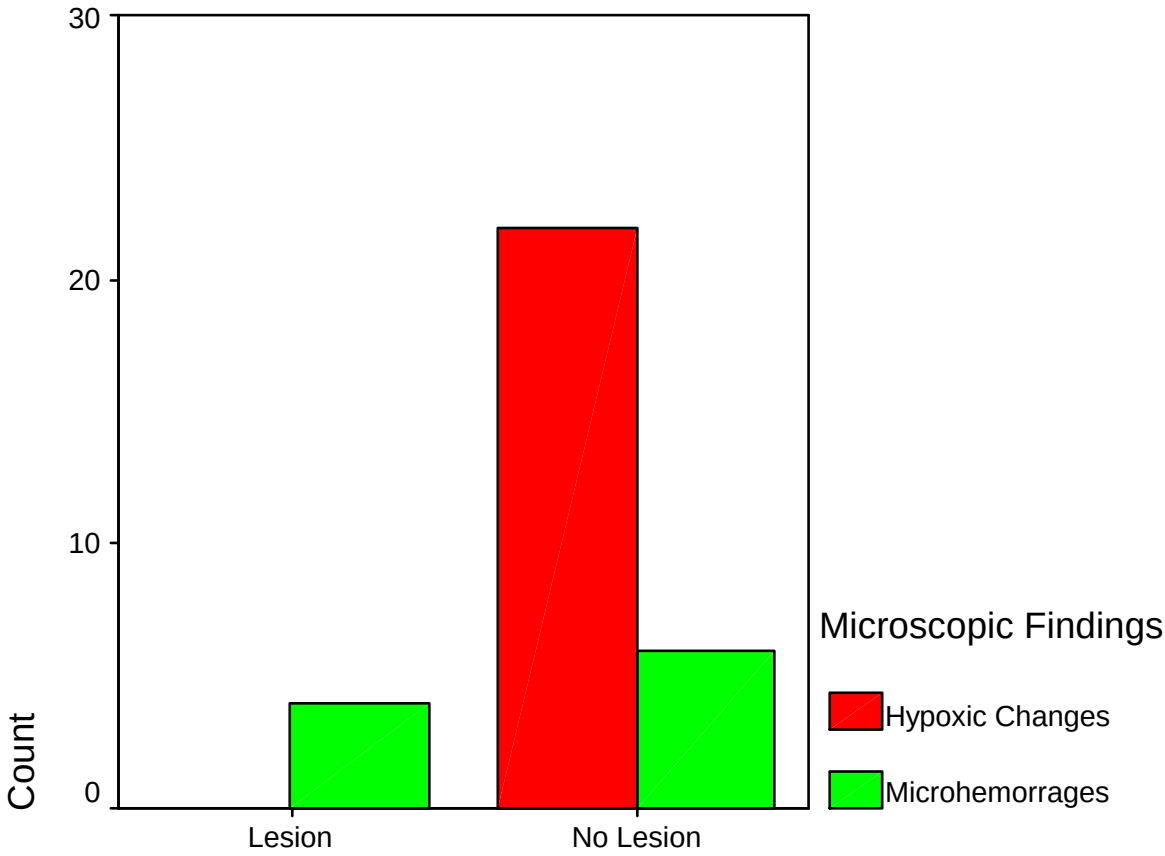
			Microscopic Findings in Autopsy : Lesions in Thalamus		
			Hypoxic Changes	Microhemorrages	Total
CT : Lesions in Pons	Lesion	Count	0	4	4
		% within CT : Lesions in Pons	.0%	100.0%	100.0%
		% within Microscopic Findings in Autopsy : Lesions in Thalamus	.0%	40.0%	12.5%
	No Lesion	Count	22	6	28
		% within CT : Lesions in Pons	78.6%	21.4%	100.0%
		% within Microscopic Findings in Autopsy : Lesions in Thalamus	100.0%	60.0%	87.5%
Total		Count	22	10	32
		% within CT : Lesions in Pons	68.8%	31.3%	100.0%
		% within Microscopic Findings in Autopsy : Lesions in Thalamus	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	10.057(b)	1	.002		
Continuity Correction(a)	6.732	1	.009		
Likelihood Ratio	10.653	1	.001		
Fisher's Exact Test				.006	.006
Linear-by-Linear Association	9.743	1	.002		
N of Valid Cases	32				

(a) Computed only for a 2x2 table

(b) 2 cells (50.0%) have expected count less than 5. The minimum expected count is 1.25.



CT : Lesions in Pons

CT : Lesions in Pons * Microscopic Findings in Autopsy : Lesions in Corpus Callosum

			Microscopic Findings in Autopsy : Lesions in Corpus Callosum			
			Hypoxic Changes	Microhemorrages	White Matter Degeneration	Total
CT : Lesions in Pons	Lesion	Count	1	3	0	4
		% within CT : Lesions in Pons	25.0%	75.0%	.0%	100.0%
		% within Microscopic Findings in Autopsy : Lesions in Corpus Callosum	6.3%	21.4%	.0%	12.5%
	No Lesion	Count	15	11	2	28
		% within CT : Lesions in Pons	53.6%	39.3%	7.1%	100.0%
		% within Microscopic Findings in Autopsy : Lesions in Corpus Callosum	93.8%	78.6%	100.0%	87.5%
Total		Count	16	14	2	32
		% within CT : Lesions in Pons	50.0%	43.8%	6.3%	100.0%
		% within Microscopic Findings in Autopsy : Lesions in Corpus Callosum	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.878(a)	2	.391
Likelihood Ratio	2.084	2	.353
Linear-by-Linear Association	.420	1	.517
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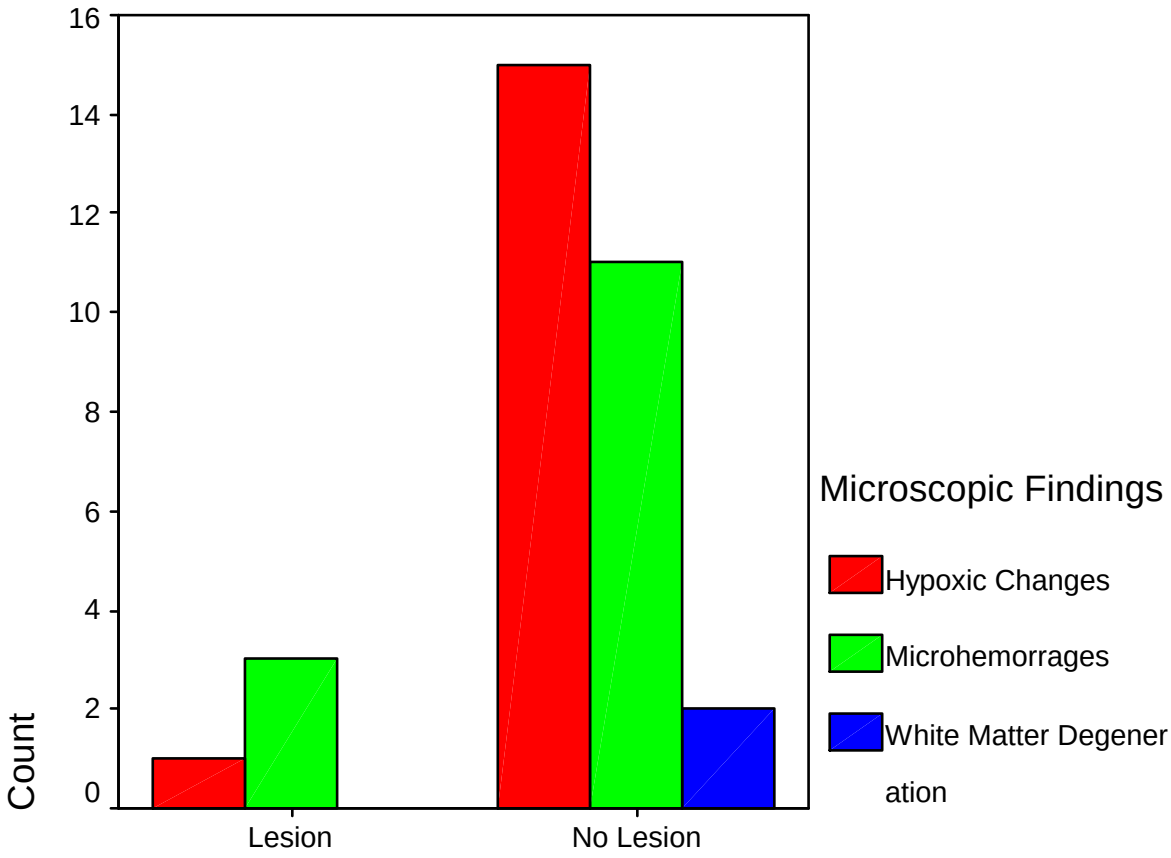
(a) 4 cells (66.7%) have expected count less than 5. The minimum expected count is .25.



CT : Lesions in Pons

CT: Lesions in Pons * Microscopic Findings in Autopsy: Lesions in Thalamus

			Microscopic Findings in Autopsy : Lesions in Thalamus		Total
			Hypoxic Changes	Microhe morrages	
CT : Lesions in Pons	Lesion	Count	0	4	4
		% within CT : Lesions in Pons	.0%	100.0%	100.0%
		% within Microscopic Findings in Autopsy : Lesions in Thalamus	.0%	40.0%	12.5%
	No Lesion	Count	22	6	28
		% within CT : Lesions in Pons	78.6%	21.4%	100.0%
		% within Microscopic Findings in Autopsy : Lesions in Thalamus	100.0%	60.0%	87.5%
Total		Count	22	10	32
		% within CT : Lesions in Pons	68.8%	31.3%	100.0%
		% within Microscopic Findings in Autopsy : Lesions in Thalamus	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	10.057(b)	1	.002		
Continuity Correction(a)	6.732	1	.009		
Likelihood Ratio	10.653	1	.001		
Fisher's Exact Test				.006	.006
Linear-by-Linear Association	9.743	1	.002		
N of Valid Cases	32				

(a) Computed only for a 2x2 table

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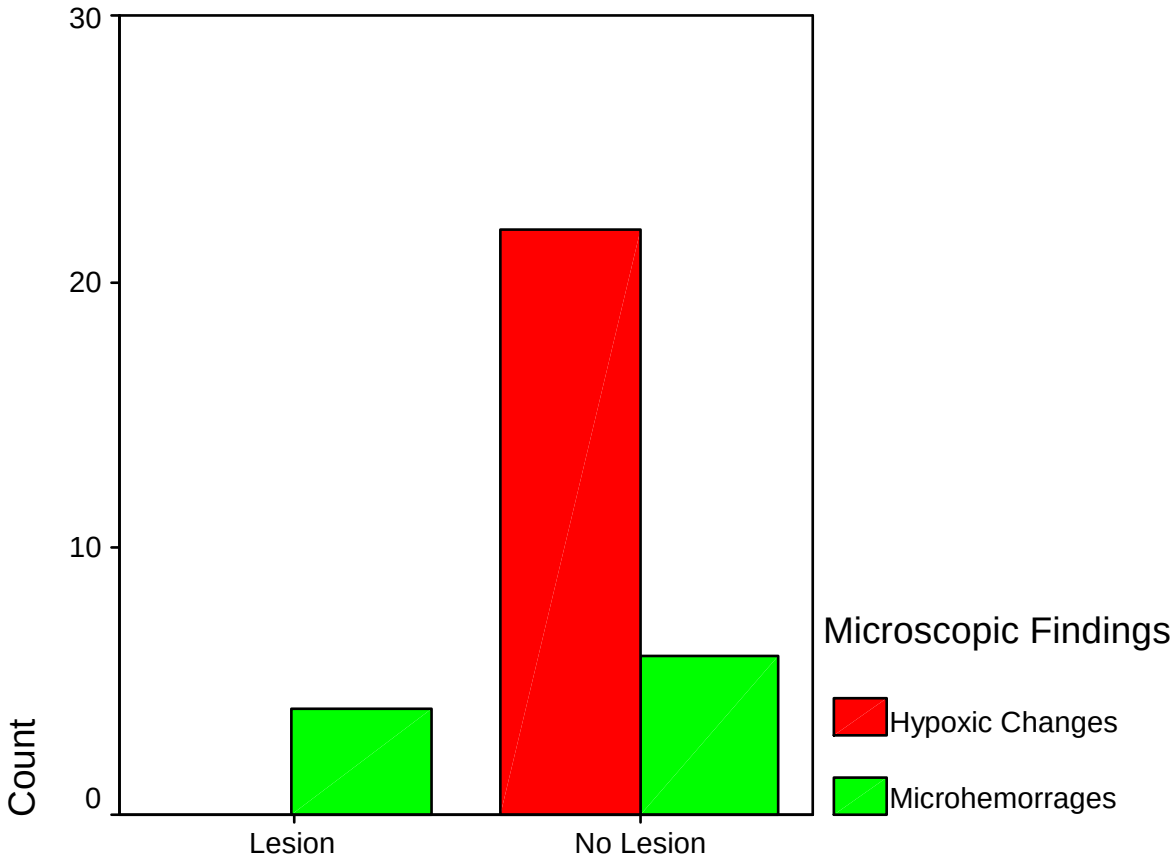

CT : Lesions in Pons

CT: Lesions in Pons * Microscopic Findings in Autopsy: Lesions in Pons

			Microscopic Findings in Autopsy : Lesions in Pons				Total
			Hypoxic Changes	Microhemorrages	White Matter Degeneration	Axonal Retraction Balls	
CT : Lesions in Pons	Lesion	Count	3	1	0	0	4
		% within CT : Lesions in Pons	75.0%	25.0%	.0%	.0%	100.0%
		% within Microscopic Findings in Autopsy : Lesions in Pons	14.3%	16.7%	.0%	.0%	12.5%
	No Lesion	Count	18	5	4	1	28
		% within CT : Lesions in Pons	64.3%	17.9%	14.3%	3.6%	100.0%
		% within Microscopic Findings in Autopsy : Lesions in Pons	85.7%	83.3%	100.0%	100.0%	87.5%
Total	Count		21	6	4	1	32
	% within CT : Lesions in Pons		65.6%	18.8%	12.5%	3.1%	100.0%
	% within Microscopic Findings in Autopsy : Lesions in Pons		100.0%	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	.871(a)	3	.832
Likelihood Ratio	1.482	3	.687
Linear-by-Linear Association	.510	1	.475
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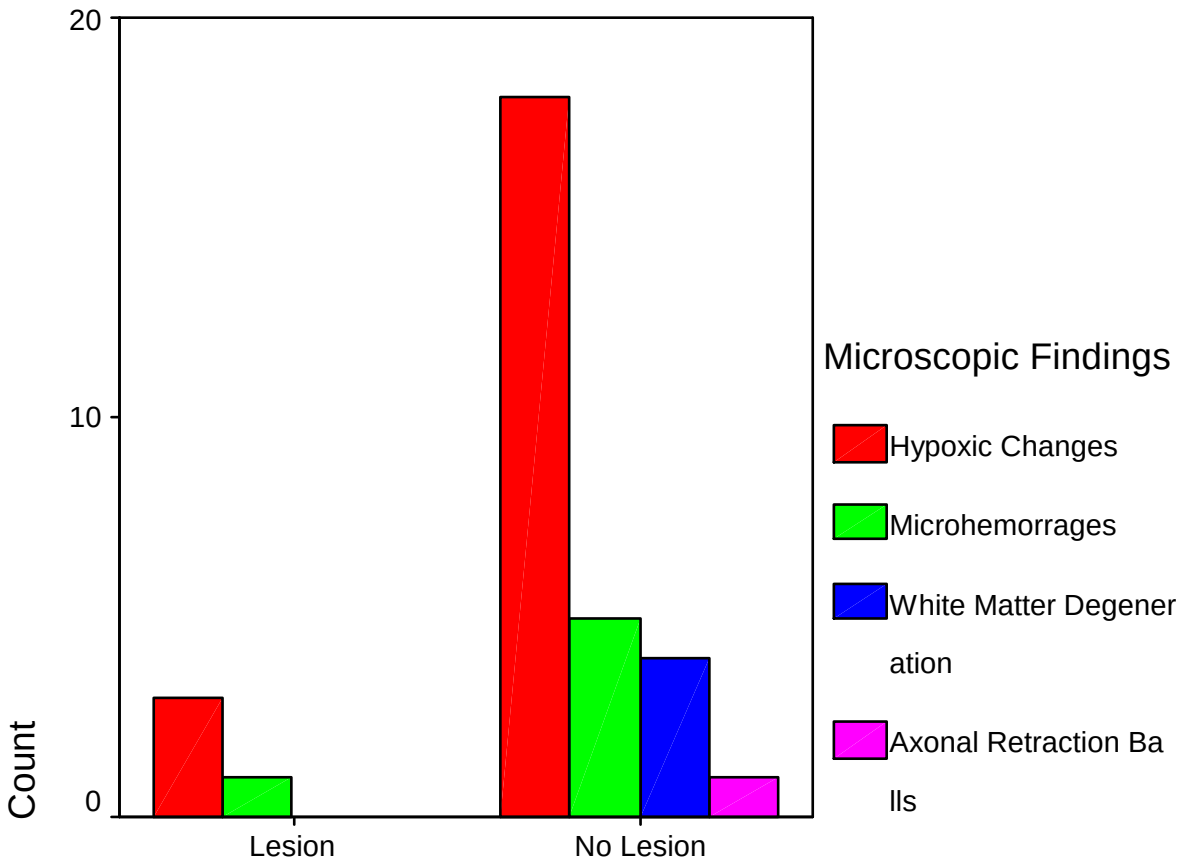


CT : Lesions in Pons

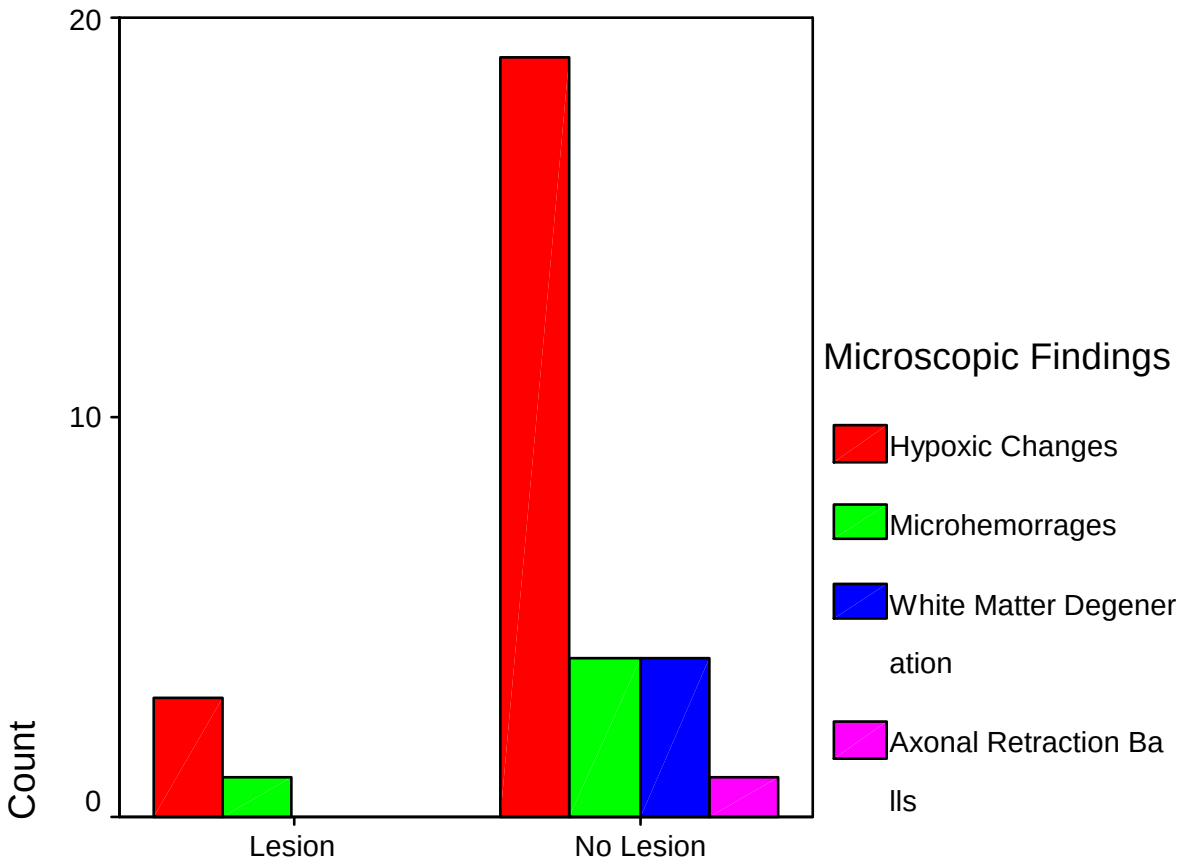
CT: Lesions in Pons * Microscopic Findings in Autopsy: Lesions in Medulla

			Microscopic Findings in Autopsy : Lesions in Medulla				
			Hypoxic Changes	Microhemorrages	White Matter Degeneration	Axonal Retraction Balls	Total
CT : Lesions in Pons	Lesion	Count	3	1	0	0	4
		% within CT : Lesions in Pons	75.0%	25.0%	.0%	.0%	100.0%
		% within Microscopic Findings in Autopsy : Lesions in Medulla	13.6%	20.0%	.0%	.0%	12.5%
	No Lesion	Count	19	4	4	1	28
		% within CT : Lesions in Pons	67.9%	14.3%	14.3%	3.6%	100.0%
		% within Microscopic Findings in Autopsy : Lesions in Medulla	86.4%	80.0%	100.0%	100.0%	87.5%
Total		Count	22	5	4	1	32
		% within CT : Lesions in Pons	68.8%	15.6%	12.5%	3.1%	100.0%
		% within Microscopic Findings in Autopsy : Lesions in Medulla	100.0%	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	.997(a)	3	.802
Likelihood Ratio	1.584	3	.663
Linear-by-Linear Association	.403	1	.526
N of Valid Cases	32		

(a) 7 cells (87.5%) have expected count less than 5. The minimum expected count is .13.



CT : Lesions in Pons

CT: Lesions in Medulla * Microscopic Findings in Autopsy : Lesions in Thalamus

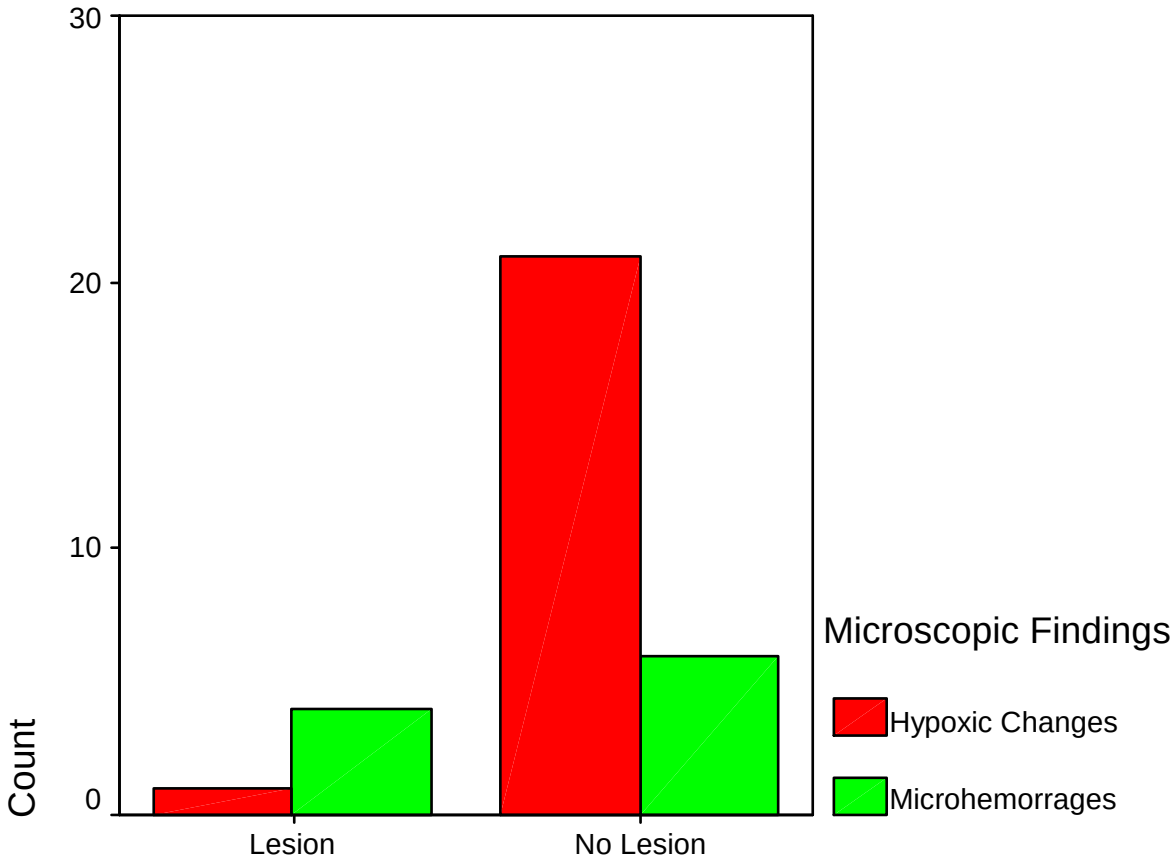
			Microscopic Findings in Autopsy : Lesions in Thalamus		Total
			Hypoxic Changes	Microhe morrages	
CT : Lesions in Medulla	Lesion	Count	1	4	5
		% within CT : Lesions in Medulla	20.0%	80.0%	100.0%
		% within Microscopic Findings in Autopsy : Lesions in Thalamus	4.5%	40.0%	15.6%
	No Lesion	Count	21	6	27
		% within CT : Lesions in Medulla	77.8%	22.2%	100.0%
		% within Microscopic Findings in Autopsy : Lesions in Thalamus	95.5%	60.0%	84.4%
Total		Count	22	10	32
		% within CT : Lesions in Medulla	68.8%	31.3%	100.0%
		% within Microscopic Findings in Autopsy : Lesions in Thalamus	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	6.555(b)	1	.010		
Continuity Correction(a)	4.142	1	.042		
Likelihood Ratio	6.141	1	.013		
Fisher's Exact Test				.024	.024
Linear-by-Linear Association	6.350	1	.012		
N of Valid Cases	32				

(a) Computed only for a 2x2 table

(b) 2 cells (50.0%) have expected count less than 5. The minimum expected count is 1.56.



CT : Lesions in Medulla

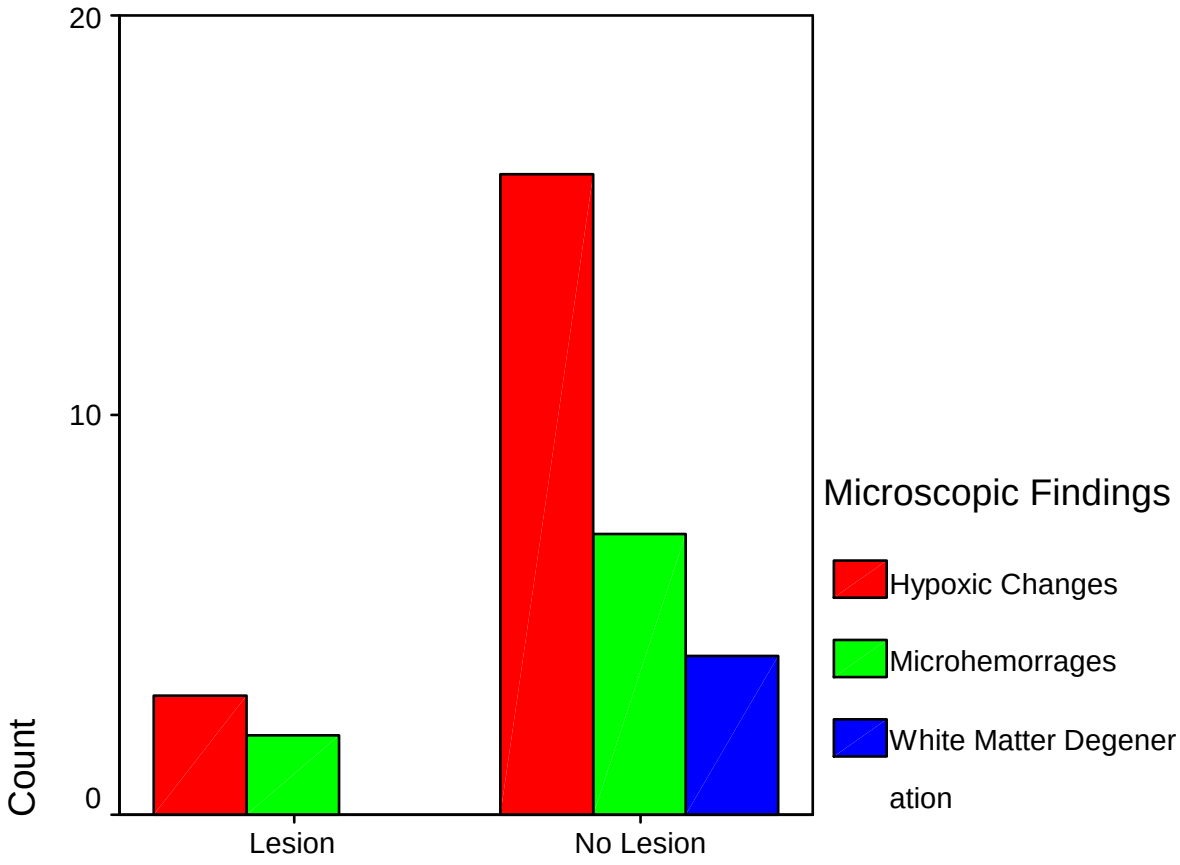
CT: Lesions in Medulla * Microscopic Findings in Autopsy: Lesions in Midbrain

			Microscopic Findings in Autopsy : Lesions in Midbrain			Total
			Hypoxic Changes	Microhemorrages	White Matter Degeneration	
CT : Lesions in Medulla	Lesion	Count	3	2	0	5
		% within CT : Lesions in Medulla	60.0%	40.0%	.0%	100.0%
		% within Microscopic Findings in Autopsy : Lesions in Midbrain	15.8%	22.2%	.0%	15.6%
	No Lesion	Count	16	7	4	27
		% within CT : Lesions in Medulla	59.3%	25.9%	14.8%	100.0%
		% within Microscopic Findings in Autopsy : Lesions in Midbrain	84.2%	77.8%	100.0%	84.4%
Total		Count	19	9	4	32
		% within CT : Lesions in Medulla	59.4%	28.1%	12.5%	100.0%
		% within Microscopic Findings in Autopsy : Lesions in Midbrain	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.038(a)	2	.595
Likelihood Ratio	1.629	2	.443
Linear-by-Linear Association	.198	1	.656
N of Valid Cases	32		

(a) 4 cells (66.7%) have expected count less than 5. The minimum expected count is .63.



CT : Lesions in Medulla

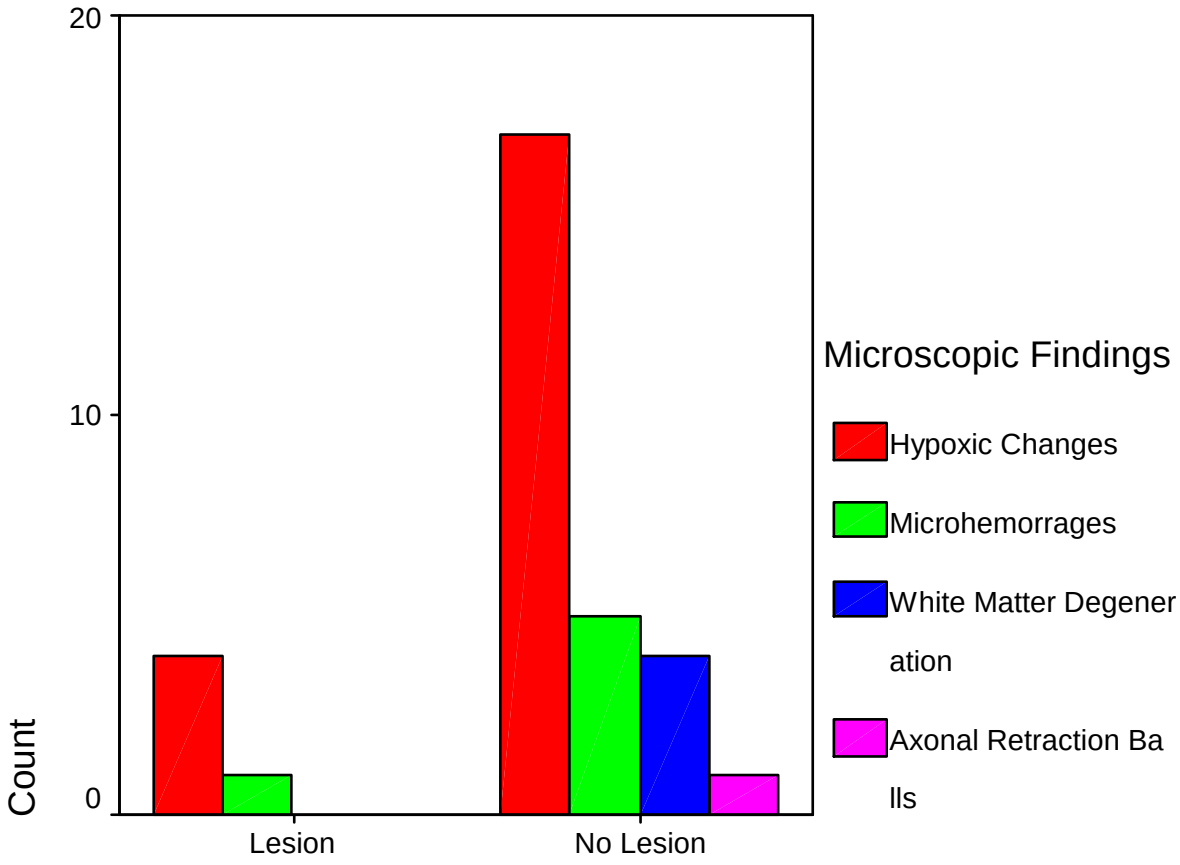
CT: Lesions in Medulla * Microscopic Findings in Autopsy: Lesions in Pons

			Microscopic Findings in Autopsy : Lesions in Pons				
			Hypoxic Changes	Microhemorrages	White Matter Degeneration	Axonal Retraction Balls	Total
CT : Lesions in Medulla	Lesion	Count	4	1	0	0	5
		% within CT : Lesions in Medulla	80.0%	20.0%	.0%	.0%	100.0%
		% within Microscopic Findings in Autopsy : Lesions in Pons	19.0%	16.7%	.0%	.0%	15.6%
	No Lesion	Count	17	5	4	1	27
		% within CT : Lesions in Medulla	63.0%	18.5%	14.8%	3.7%	100.0%
		% within Microscopic Findings in Autopsy : Lesions in Pons	81.0%	83.3%	100.0%	100.0%	84.4%
Total		Count	21	6	4	1	32
		% within CT : Lesions in Medulla	65.6%	18.8%	12.5%	3.1%	100.0%
		% within Microscopic Findings in Autopsy : Lesions in Pons	100.0%	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.117(a)	3	.773
Likelihood Ratio	1.880	3	.598
Linear-by-Linear Association	.918	1	.338
N of Valid Cases	32		

(a) 6 cells (75.0%) have expected count less than 5. The minimum expected count is .16.



CT : Lesions in Medulla

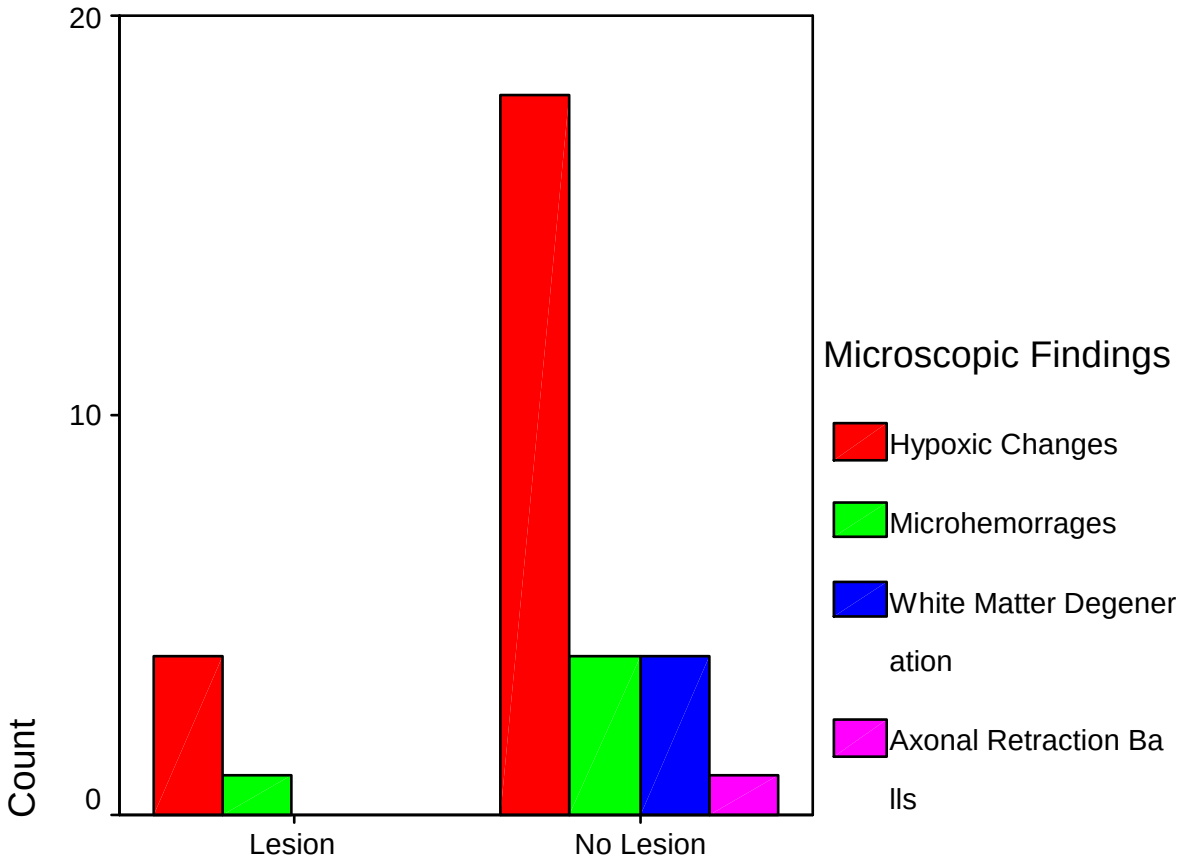
CT: Lesions in Medulla * Microscopic Findings in Autopsy: Lesions in Medulla

			Microscopic Findings in Autopsy : Lesions in Medulla				
			Hypoxic Changes	Microhemorrages	White Matter Degeneration	Axonal Retraction Balls	Total
CT : Lesions in Medulla	Lesion	Count	4	1	0	0	5
		% within CT : Lesions in Medulla	80.0%	20.0%	.0%	.0%	100.0%
		% within Microscopic Findings in Autopsy : Lesions in Medulla	18.2%	20.0%	.0%	.0%	15.6%
	No Lesion	Count	18	4	4	1	27
		% within CT : Lesions in Medulla	66.7%	14.8%	14.8%	3.7%	100.0%
		% within Microscopic Findings in Autopsy : Lesions in Medulla	81.8%	80.0%	100.0%	100.0%	84.4%
Total		Count	22	5	4	1	32
		% within CT : Lesions in Medulla	68.8%	15.6%	12.5%	3.1%	100.0%
		% within Microscopic Findings in Autopsy : Lesions in Medulla	100.0%	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.108(a)	3	.775
Likelihood Ratio	1.871	3	.600
Linear-by-Linear Association	.752	1	.386
N of Valid Cases	32		

(a) 7 cells (87.5%) have expected count less than 5. The minimum expected count is .16.



CT : Lesions in Medulla

CONCLUSION

CONCLUSION

1. Most common age group was 30-39 years
2. Patients with GCS less than 5 mostly died. (84.4 %)
3. More than 50% of the Patients with clinical grading 3 expired.
4. In this study most patients with severe DAI did not have any skull fractures.
5. CT brain was normal in one third of patients.
6. SAH was the commonest gross autopsy finding (62.5%)
7. Hypoxic Changes with cellular swelling were the common findings in microscopic examination and was statistically significant in parameters evaluated.
8. All patients with normal CT brain, microscopically demonstrable lesions were common & statistically significant.
9. Microscopic Lesions in Thalamus was more statistically significant.

INFERENCE

Thus in our study we found that in most cases CT Brain findings did not correlate with severity of head injury.

Postmortem studies conclude that edema (cellular swelling) in brain stem and corpus callosum were the predisposing causes of death probably due to hypoxia and free radical in most cases.

These aspects need further biochemical analytical study and a larger sample study which the investigator proposes to take up as a future research work.

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BIBLIOGRAPHY

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Author information

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Iwadate Y1, Ono J, Okimura Y, Suda S, Isobe K, Yamaura A.
Author information

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Wang H1, Duan G, Zhang J, Zhou D.

Iwadate, Ono J, Okimura Y, Suda S, Isobe K, Yamaura A.

APPENDICES

APPENDIX I - Ethical Committee Approval

INSTITUTIONAL ETHICS COMMITTEE
MADRAS MEDICAL COLLEGE, CHENNAI-3

EC Reg No.ECR/270/Inst./TN/2013
Telephone No. 044 25305301
Fax : 011 25363970

CERTIFICATE OF APPROVAL

To
Dr.S.Palanisamy
Postgraduate in M.Ch.(Neuro Surgery)
Madras Medical College
Chennai – 600 003.

Dear Dr.S.Palanisamy,

The Institutional Ethics Committee has considered your request and approved your study titled **"Comparative Clinical-Radiologic-Post mortem Study of Diffuse Axonal Injury in Severe Head Injury Patients" No.22012015.**

The following members of Ethics Committee were present in the meeting held on 20.01.2015 conducted at Madras Medical College, Chennai-3.

1. Dr.C.Rajendran, M.D.,	: Chairperson
2. Dr.R.Vimala, M.D., Dean, MMC, Ch-3	: Deputy Chairperson
3. Prof.B.Kalaiselvi, M.D., Vice-Principal, MMC, Ch-3	: Member Secretary
4. Prof.R.Nandini, M.D., Inst.of Pharmacology, MMC	: Member
5. Prof.P.Ragumani, M.S., Professor, Inst.of Surgery, MMC	: Member
6. Prof.Md.Ali, M.D., D.M., Prof. & HOD of Medl.G.E., MMC	: Member
7. Prof.K.Ramadevi, Director , Inst.of Biochemistry, MMC	: Member
8. Prof.Saraswathy, M.D., Director, Pathology, MMC, Ch-3	: Member
9. Prof.S.G.Sivachidambaram, M.D., Director i/c, Inst.of Internal Medicine, MMC	: Member
10. Thiru S.Rameshkumar, Administrative Officer	: Lay Person
11. Thiru S.Govindasamy, B.A., B.L.,	: Lawyer
12. Tmt.Arnold Saulina, M.A., MSW.,	: Social Scientist

We approve the proposal to be conducted in its presented form.

The Institutional Ethics Committee expects to be informed about the progress of the study and SAE occurring in the course of the study, any changes in the protocol and patients information/informed consent and asks to be provided a copy of the final report.

22/1/15

Member Secretary, Ethics Committee

MEMBER SECRETARY
INSTITUTIONAL ETHICS COMMITTEE
MADRAS MEDICAL COLLEGE
CHENNAI-600 003

APPENDIX II - Copy of Patient Information Sheet

ஆராய்ச்சித் தகவல் தாள்

INFORMATION SHEET

- ✓ We are conducting a **Comparative Clinical-Radiologic-Post mortem Study of Diffuse Axonal Injury in Severe Head Injury Patients"**

- ✓ The purpose of this study is to determine the incidence of complications, safety of various methods of **Comparative Clinical-Radiologic-Post mortem Study of Diffuse Axonal Injury in Severe Head Injury Patients**.

- ✓ The privacy of the patients in the research will be maintained throughout the study. In the event of any publication or presentation resulting from the research, no personally identifiable information will be shared.

- ✓ Taking part in this study is voluntary. You are free to decide whether to participate in this study or to withdraw at any time; your decision will not result in any loss of benefits to which you are otherwise entitled.

- ✓ The results may be intimated to you at the end of the study period or during the study if anything is found abnormal which may aid in the management or treatment.

ஆராய்ச்சி தகவல் தாள்

இராஜீவ் காந்தி அரசு பொது மருத்துவமனைக்கு மிக பலமான தலைக்காயத்தில் ஏற்படும் ஒட்டுமொத்த மூளை நரம்பணு சிதைவினால் ஏற்படும் விளைவுகளையும், நுண்கதிர் ஆய்வின் முடிவையும், பிரேத பரிசோதனை ஆய்வு முடிவினையும் ஒப்பிட்டு ஆராய்வதே இந்த ஆராய்ச்சியின் நோக்கமாகும்.

இந்த ஆராய்ச்சியின் முடிவுகளை அல்லது கருத்துக்களை வெளியிடும் போதோ அல்லது ஆராய்ச்சியின் போதோ உயிரிழந்த நோயாளியின் பெயரையோ அல்லது அடையாளங்களையோ வெளியிட மாட்டோம் என்பதையும் தெரிவித்துக்கொள்கிறோம்.

இந்த ஆராய்ச்சியில் பங்கேற்பது தங்களுடைய விருப்பத்தின் பேரில் தான் இருக்கிறது. மேலும் நீங்கள் எந்நேரமும் இந்த ஆராய்ச்சியிலிருந்து பின்வாங்கலாம் என்பதையும் தெரிவித்துக்கொள்ளலாம்.

ஆராய்ச்சியாளர் கையொப்பம்

உறவினரின் கையொப்பம்

தேதி:

APPENDIX III - Copy of Informed Consent
ஆராய்ச்சி ஒப்புதல் கடிதம்

PATIENT CLOSE RELAIVES CONSENT FORM

Study Details Comparative Clinical-Radiologic-Post mortem Study of Diffuse Axonal Injury in Severe Head Injury Patients
Study Centre : Rajiv Gandhi Government General hospital, Madras Medical College, Chennai - 600 003.

Patient close relatives may check (√) these boxes:

I confirm that I have understood the purpose of procedure for the above study. I have the opportunity to ask question and all my questions and doubts have been answered to my complete satisfaction. ☐

I understand that participation of my relatives ---------- in the study is voluntary and that I am free to withdraw at any time without giving reason, without my legal rights being affected. ☐

I understand that the ethical committee and the regulatory authorities will not need permission to look at the health records, both in respect of current study and any further research that may be conducted in relation to it, even if my (Neuro ICU ward) ward withdraw from the study I agree to this access. However, I understand that my identity will not be revealed in any information released to third parties or published, unless as required under the law. I agree not to restrict the use of any data or results that arise from this study. ☐

I agree to take part in the above study and to comply with the instructions given during the study and faithfully cooperate with the study team and to immediately inform the study staff if my relatives suffers from any deterioration in his/her health or well being or any unexpected or unusual symptoms. ☐

I hereby give permission to perform complete clinical examination including diagnostic tests ☐

I hereby consent to participate in this study on. ☐
Signature / Thumb impression:
Patient relative's Name and Address:
Place: who has given consent for the study :

Date:

Signature of Investigator: Place:
Study Investigator's Name: Date:

சுய ஒப்புதல் படிவம்

ஆய்வு செய்யப்படும் தலைப்பு :

மிக பலமான தலைக்காயத்தில் ஏற்படும் ஒட்டுமொத்த மூளை நரம்பணு சிதைவினால் ஏற்படும் விளைவுகளையும், நுண்கதிர் ஆய்வின் முடிவையும், பிரேத பரிசோதனை ஆய்வு முடிவினையும் ஒப்பிடுதல் பற்றிய ஆய்வு.

ஆராய்ச்சியாளர் பெயர் : மரு. சீ. பழனிசாமி,
நரம்பியல் அறுவை சிகிச்சை பிரிவு,
சென்னை நரம்பியல் துறை,
இராஜீவ் காந்தி அரசு பொது மருத்துவமனை மற்றும்
சென்னை மருத்துவக் கல்லூரி, சென்னை - 600 003.

பங்கு பெறுபவரின் பெயர் : உறவுமுறை :
பங்கு பெறுபவரின் எண். :

பங்கு பெறுபவர் இதனை (✓) குறிக்கவும்

மேலே குறிப்பிட்டுள்ள மருத்துவ ஆய்வின் விவரங்களை நோயாளியின் உறவினருக்கு விளக்கப்பட்டது. அவருடைய சந்தேகங்களை கேட்கவும், அதற்கான தகுந்த விளக்கங்களைப் பெறவும் வாய்ப்பளிக்கப்பட்டது. ☐

நோயாளியின் உறவினரின் சம்மதத்துடன் இந்த ஆய்வு நடத்தப்படுகிறது. எந்தக் காரணத்தினாலோ எந்தக் கட்டத்திலும் எந்த சட்ட சிக்கலுக்கும் உட்படாமல் நான் இவ்ஆய்வில் இருந்து விலகிக் கொள்ளலாம் என்றும் அறிந்து கொண்டேன். ☐

இந்த ஆய்வு சம்மந்தமாகவோ, இதை சார்ந்த மேலும் ஆய்வு மேற்கொள்ளும்போதும் இந்த ஆய்வில் பங்குபெறும் மருத்துவர் என்னுடைய உறவினரின் மருத்துவ அறிக்கைகளைப் பார்ப்பதற்கு என் அனுமதி தேவையில்லை என அறிந்து கொள்கிறேன். நான் ஆய்வில் இருந்து விலகிக் கொண்டாலும் இது பொருந்தும் என அறிகிறேன். ☐

இந்த ஆய்வின் மூலம் கிடைக்கும் தகவல்களையும், பரிசோதனை முடிவுகளையும் மற்றும் சிகிச்சை தொடர்பான தகவல்களையும் மருத்துவர் மேற்கொள்ளும் ஆய்வில் பயன்படுத்திக் கொள்ளவும் அதைப் பிரசுரிக்கவும் என் முழு மனதுடன் சம்மதிக்கிறேன். ☐

இந்த ஆய்வில் நோயாளியை உட்படுத்த நோயாளியின் உறவினராகிய நான் ஒத்துக்கொள்கிறேன். எனக்குக் கொடுக்கப்பட்ட அறிவுரைகளின்படி நடந்து கொள்வதுடன், இந்த ஆய்வை மேற்கொள்ளும் மருத்துவ அணிக்கு உண்மையுடன் இருப்பேன் என்றும் உறுதியளிக்கிறேன். ☐

இந்த ஆய்வில் என் உறவினரின் மருத்துவப் பரிசோதனை, இரத்தப் பரிசோதனை மற்றும் கதிர்வீச்சு பரிசோதனை செய்து கொண்ட விவரங்களை பகிர்ந்து கொள்ள முழு மனதுடன் சம்மதிக்கிறேன். ☐

உயிரிழந்தவரின் பெயர் .....

உறவினரின் கையொப்பம்..... இடம்..... தேதி.....
கட்டைவிரல் ரேகை

உறவினரின் பெயர் மற்றும் விலாசம்.....

ஆய்வாளரின் கையொப்பம்..... இடம்..... தேதி

ஆய்வாளரின் பெயர்.....

(இந்த ஆராய்ச்சியின் முடிவுகளை அல்லது கருத்துக்களை வெளியிடும் போதோ அல்லது ஆராய்ச்சியின் போதோ நோயாளியின் பெயரையோ அல்லது அடையாளங்களையோ வெளியிட மாட்டோம் என்பதையும் தெரிவித்துக்கொள்கிறோம்.)

APPENDIX IV - COPY OF PROFORMA USED

Name of the Patient : Address
Age :
Sex :
Date of Trauma :
Mode of Injury :
Date of Admission :
IP/MIN No :

HISTORY OF

LOC
Moderate
Severe
Vomiting
ENT Bleed
Seizure
Weakness Limbs
DM/HT
Alcohol
Other Symptoms

CLINICAL FINDINGS

Date :
GCS :
Pupils :
DEM :
Paucity of Movement :
Other :

X-RAY /CT BRANI / CT- ANGIO

Date	Findings

OTHER INJURIES

DATE OF DEATH

AUTOPSY FINDING

Macroscopic / Gross Findings

HISTOPATHOLOGY FINDING

Thalamus
Corpus Call sum
Mid Brain
Pons
Medulla

MASTER CHART

APPENDIX V –MASTER CHART

S.NO	1	2	3	4	5
Name	RAJINI	RAJENDRAN	KANNAN	SHANTHI	NANJAMMA
Age	32	50	30	38	58
Sex	M	M	M	F	F
IP No	48	307	309	1056	2257
Date of Trauma	01-Jan-15	02-Jan-15	02-Jan-15	03-Jan-15	06-Jan-15
Date of Admission	01-Jan-15	02-Jan-15	02-Jan-15	03-Jan-15	06-Jan-15
Expired date	01-Jan-15	06-Jan-15	04-Jan-15	06-Jan-15	20-Jan-15
Mode of Injury	RTA	RTA	RTA	RTA	RTA
H/o LOC	H/o LOC	H/o LOC	H/o LOC	H/o LOC	H/o LOC
H/o Seizures	H/o Seizures	H/o Seizures	H/o Seizures	No H/o Seizures	H/o Seizures
H/o Vomiting	No H/o Vomiting	No H/o Vomiting	No H/o Vomiting	H/o Vomiting	No H/o Vomiting
H/o ENT Bleed	No H/o ENT Bleed	No H/o ENT Bleed	No H/o ENT Bleed	H/o ENT Bleed	H/o ENT Bleed
GCS	3 of 15	5 of 15	4 of 15	4 of 15	6 of 15
E	1	1	1	1	1
V	ET	ET	ET	ET	ET
M	1	3	2	2	4
Pupil Size	4mm	3mm	3.5mm	3mm	3mm
Pupillary Reflex	Absent	Absent	Absent	Absent	Present
DEM	Absent	Absent	Absent	Absent	Present
Clinical Grade	3	3	3	3	3
Neurological Deficity	No Neurological Deficit	No Neurological Deficit	No Neurological Deficit	No Neurological Deficit	No Neurological Deficit
CT Grade	2	1	2	2	1
CT : Lesions in Thalamus	Lesion	No Lesion	No Lesion	No Lesion	No Lesion
CT : Lesions in Corpus Callosum	No Lesion	No Lesion	No Lesion	No Lesion	No Lesion
CT : Lesions in Midbrain	No Lesion	No Lesion	Lesion	No Lesion	No Lesion
CT : Lesions in Pons	No Lesion	No Lesion	Lesion	No Lesion	No Lesion
CT : Lesions in Medulla	No Lesion	No Lesion	Lesion	No Lesion	No Lesion
Gross Findings in Autopsy	Right Thalamic ICH	Subdural Collection	Contused Brain with Hemorrhagic Spots	Left Frontal Thin SDH	Subdural Collection
Microscopic Findings in Autopsy : Lesions in Thalamus	Microhemorrages	Hypoxic Changes	Microhemorrages	Hypoxic Changes	Hypoxic Changes
Microscopic Findings in Autopsy : Lesions in Corpus Callosum	Microhemorrages	Hypoxic Changes	Microhemorrages	Microhemorrages	Microhemorrages
Microscopic Findings in Autopsy : Lesions in Midbrain	Microhemorrages	Microhemorrages	Microhemorrages	Hypoxic Changes	Microhemorrages
Microscopic Findings in Autopsy : Lesions in Pons	Microhemorrages	Microhemorrages	Microhemorrages	Hypoxic Changes	Hypoxic Changes
Microscopic Findings in Autopsy : Lesions in Medulla	Microhemorrages	Microhemorrages	Microhemorrages	Hypoxic Changes	Hypoxic Changes

S.NO	6	7	8	9	10	11
Name	KALAIYARASU	KADAR BASHA	ARJUNAN	CHINNAPONNU	SUKUMAR	MARIMUTHU
Age	46	35	30	60	30	50
Sex	M	M	M	F	M	M
IP No	3923	4273	5111	6365	8156	8938
Date of Trauma	11-Jan-15	11-Jan-15	15-Jan-15	19-Jan-15	23-Jan-15	25-Jan-15
Date of Admission	11-Jan-15	11-Jan-15	15-Jan-15	19-Jan-15	23-Jan-15	26-Jan-15
Expired date	17-Jan-15	16-Jan-15	02-Mar-15	26-Jan-15	05-Feb-15	28-Jan-15
Mode of Injury	RTA	RTA	RTA	RTA	RTA	RTA
H/o LOC	H/o LOC	H/o LOC	H/o LOC	H/o LOC	H/o LOC	H/o LOC
H/o Seizures	No H/o Seizures	H/o Seizures	No H/o Seizures	H/o Seizures	H/o Seizures	No H/o Seizures
H/o Vomiting	No H/o Vomiting	H/o Vomiting	H/o Vomiting	H/o Vomiting	H/o Vomiting	No H/o Vomiting
H/o ENT Bleed	No H/o ENT Bleed	No H/o ENT Bleed	No H/o ENT Bleed	No H/o ENT Bleed	No H/o ENT Bleed	No H/o ENT Bleed
GCS	5 of 15	5 of 15	6 of 15	4 of 15	5 of 15	4 of 15
E	1	1	2	1	1	1
V	ET	ET	ET	ET	ET	ET
M	3	3	3	2	3	2
Pupil Size	3mm	3mm	3mm	3mm	3mm	3.5mm
Pupillary Reflex	Present	Absent	Present	Absent	Absent	Absent
DEM	Present	Absent	Present	Absent	Absent	Absent
Clinical Grade	3	3	2	3	3	2
Neurological Deficity	No Neurological Deficit	No Neurological Deficit	No Neurological Deficit	Relative Left Paucity	No Neurological Deficit	No Neurological Deficit
CT Grade	2	1	2	2	1	2
CT : Lesions in Thalamus	No Lesion	No Lesion	No Lesion	Lesion	No Lesion	No Lesion
CT : Lesions in Corpus Callosum	No Lesion	No Lesion	No Lesion	No Lesion	No Lesion	No Lesion
CT : Lesions in Midbrain	No Lesion	No Lesion	No Lesion	No Lesion	No Lesion	No Lesion
CT : Lesions in Pons	No Lesion	No Lesion	No Lesion	No Lesion	No Lesion	No Lesion
CT : Lesions in Medulla	No Lesion	No Lesion	No Lesion	No Lesion	No Lesion	No Lesion
Gross Findings in Autopsy	Left Sylvian Region ICH	Subdural Collection	Left Ventricular IVH	Right Sylvian Region ICH	Subdural Collection	Diffuse Punctate Haemorrhagic Spots
Microscopic Findings in Autopsy : Lesions in Thalamus	Microhemorrages	Microhemorrages	Hypoxic Changes	Hypoxic Changes	Hypoxic Changes	Microhemorrages
Microscopic Findings in Autopsy : Lesions in Corpus Callosum	Hypoxic Changes	Microhemorrages	Hypoxic Changes	Hypoxic Changes	Hypoxic Changes	Microhemorrages
Microscopic Findings in Autopsy : Lesions in Midbrain	Hypoxic Changes	Hypoxic Changes	Hypoxic Changes	White Matter Degeneration	White Matter Degeneration	Microhemorrages
Microscopic Findings in Autopsy : Lesions in Pons	Hypoxic Changes	Hypoxic Changes	Axonal Swelling	White Matter Degeneration	White Matter Degeneration	Microhemorrages
Microscopic Findings in Autopsy : Lesions in Medulla	Hypoxic Changes	Hypoxic Changes	Axonal Swelling	White Matter Degeneration	White Matter Degeneration	Microhemorrages

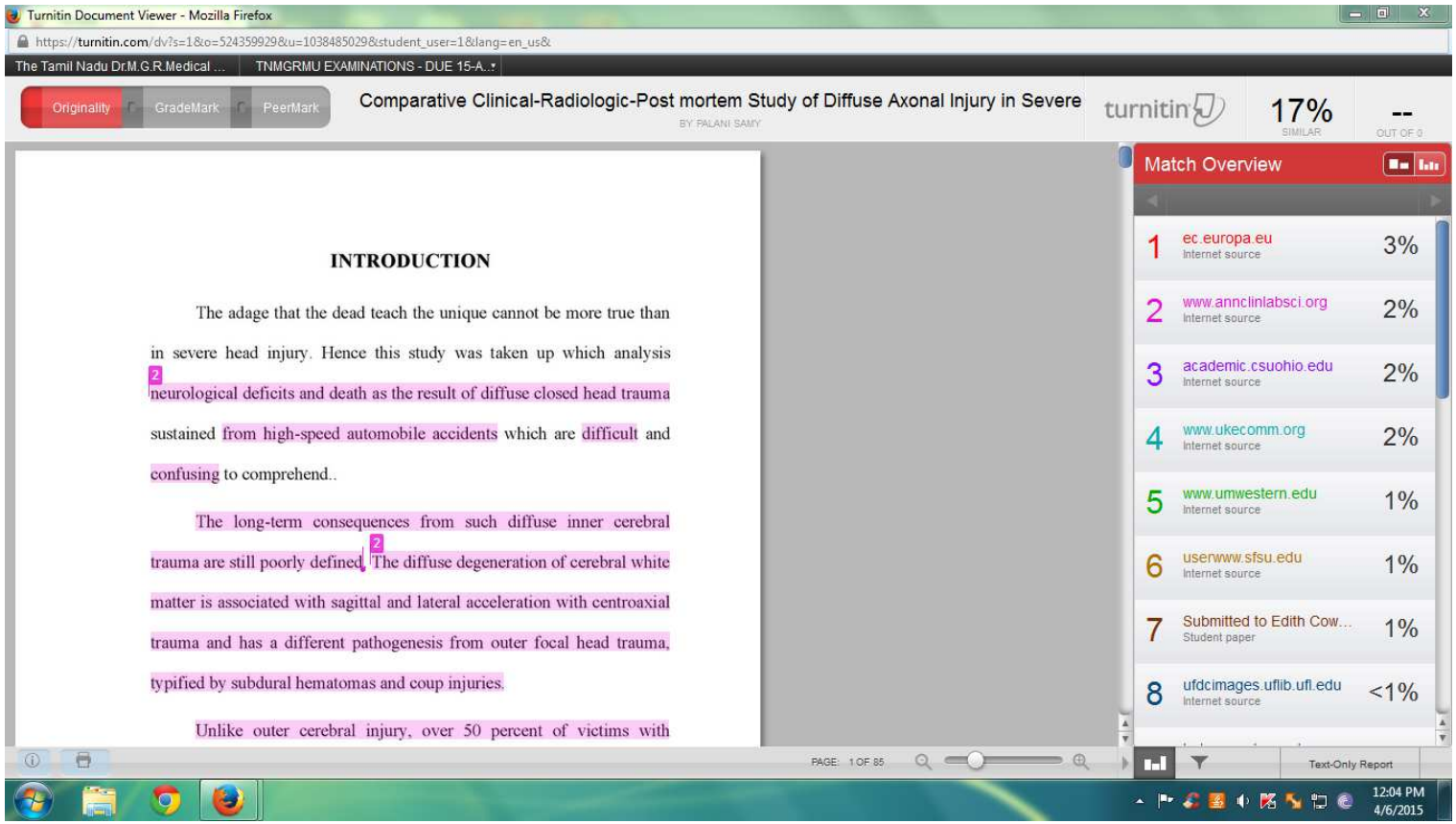
S.NO	12	13	14	15	16	17
Name	ANNAMALAI	ELUMALAI	MANI	KASIYAMMAL	SELVAM	RAMESH
Age	28	65	50	45	60	27
Sex	M	M	M	F	M	M
IP No	9989	10761	12271	12664	13254	14034
Date of Trauma	28-Jan-15	30-Jan-15	03-Feb-15	03-Feb-15	07-Feb-15	08-Feb-15
Date of Admission	28-Jan-15	30-Jan-15	04-Feb-15	04-Feb-15	07-Feb-15	08-Feb-15
Expired date	02-Jan-15	02-Mar-15	06-Feb-15	05-Feb-15	09-Feb-15	09-Feb-15
Mode of Injury	RTA	RTA	RTA	RTA	RTA	RTA
H/o LOC	H/o LOC	H/o LOC	H/o LOC	H/o LOC	H/o LOC	H/o LOC
H/o Seizures	No H/o Seizures	H/o Seizures	H/o Seizures	H/o Seizures	No H/o Seizures	No H/o Seizures
H/o Vomiting	No H/o Vomiting	H/o Vomiting	H/o Vomiting	No H/o Vomiting	H/o Vomiting	No H/o Vomiting
H/o ENT Bleed	No H/o ENT Bleed	No H/o ENT Bleed	No H/o ENT Bleed	No H/o ENT Bleed	H/o ENT Bleed	No H/o ENT Bleed
GCS	3 of 15	5 of 15	5 of 15	3 of 15	6 of 15	3 of 15
E	1	1	1	1	1	1
V	ET	ET	ET	ET	ET	ET
M	1	3	3	1	4	1
Pupil Size	4mm	3.5mm	3mm	4mm	3 mm	4mm
Pupillary Reflex	Absent	Absent	Absent	Absent	Present	Absent
DEM	Absent	Absent	Absent	Absent	Present	Absent
Clinical Grade	3	3	2	2	2	2
Neurological Deficity	No Neurological Deficit	No Neurological Deficit	No Neurological Deficit	No Neurological Deficit	No Neurological Deficit	No Neurological Deficit
CT Grade	1	1	2	1	1	2
CT : Lesions in Thalamus	No Lesion	No Lesion	Lesion	No Lesion	No Lesion	Lesion
CT : Lesions in Corpus Callosum	No Lesion	No Lesion	Lesion	No Lesion	No Lesion	Lesion
CT : Lesions in Midbrain	No Lesion	No Lesion	Lesion	No Lesion	No Lesion	No Lesion
CT : Lesions in Pons	No Lesion	No Lesion	Lesion	No Lesion	No Lesion	No Lesion
CT : Lesions in Medulla	No Lesion	No Lesion	Lesion	No Lesion	No Lesion	No Lesion
Gross Findings in Autopsy	Subdural Collection	Subdural Collection	Small Bifrontal Contusion	Subdural Collection	Subdural Collection	Right Frontal ICH
Microscopic Findings in Autopsy : Lesions in Thalamus	Hypoxic Changes	Hypoxic Changes	Microhemorrages	Hypoxic Changes	Hypoxic Changes	Hypoxic Changes
Microscopic Findings in Autopsy : Lesions in Corpus Callosum	Hypoxic Changes	Microhemorrages	Hypoxic Changes	Hypoxic Changes	Hypoxic Changes	Hypoxic Changes
Microscopic Findings in Autopsy : Lesions in Midbrain	Microhemorrages	Microhemorrages	Hypoxic Changes	Hypoxic Changes	Hypoxic Changes	Hypoxic Changes
Microscopic Findings in Autopsy : Lesions in Pons	Microhemorrages	Hypoxic Changes	Hypoxic Changes	Hypoxic Changes	Hypoxic Changes	Hypoxic Changes
Microscopic Findings in Autopsy : Lesions in Medulla	Microhemorrages	Hypoxic Changes	Hypoxic Changes	Hypoxic Changes	Hypoxic Changes	Hypoxic Changes

S.NO	18	19	20	21	22	23
Name	SELVARAJ	DILLIBABU	RENUKA	DHANALAKSHMI	BIKAS RAWTH	SATHISH
Age	51	35	18	45	36	31
Sex	M	M	F	F	M	M
IP No	19378	19487	19745	20013	20915	21801
Date of Trauma	21-Feb-15	21-Feb-15	20-Feb-15	23-Feb-15	25-Feb-15	27-Feb-15
Date of Admission	22-Feb-15	22-Feb-15	20-Feb-15	23-Feb-15	25-Feb-15	27-Feb-15
Expired date	23-Feb-15	27-Feb-15	22-Feb-15	26-Feb-15	07-Mar-15	03-Jan-15
Mode of Injury	RTA	RTA	RTA	RTA	RTA	RTA
H/o LOC	H/o LOC	H/o LOC	H/o LOC	H/o LOC	H/o LOC	H/o LOC
H/o Seizures	No H/o Seizures	No H/o Seizures	H/o Seizures	No H/o Seizures	H/o Seizures	No H/o Seizures
H/o Vomiting	No H/o Vomiting	H/o Vomiting	No H/o Vomiting	H/o Vomiting	H/o Vomiting	No H/o Vomiting
H/o ENT Bleed	H/o ENT Bleed	H/o ENT Bleed	H/o ENT Bleed	No H/o ENT Bleed	H/o ENT Bleed	No H/o ENT Bleed
GCS	3 of 15	3 of 15	6 of 15	5 of 15	5 of 15	4 of 15
E	1	1	2	1	1	1
V	ET	ET	ET	ET	ET	ET
M	1	1	3	3	3	2
Pupil Size	4mm	4mm	3 mm	3mm	4mm	3mm
Pupillary Reflex	Absent	Absent	Present	Absent	Absent	Absent
DEM	Absent	Absent	Present	Absent	Absent	Absent
Clinical Grade	2	3	3	3	3	3
Neurological Deficity	No Neurological Deficit	No Neurological Deficit	No Neurological Deficit	No Neurological Deficit	No Neurological Deficit	No Neurological Deficit
CT Grade	1	1	1	1	1	2
CT : Lesions in Thalamus	No Lesion	No Lesion	No Lesion	No Lesion	No Lesion	No Lesion
CT : Lesions in Corpus Callosum	No Lesion	No Lesion	No Lesion	No Lesion	No Lesion	No Lesion
CT : Lesions in Midbrain	No Lesion	No Lesion	No Lesion	No Lesion	No Lesion	Lesion
CT : Lesions in Pons	No Lesion	No Lesion	No Lesion	No Lesion	No Lesion	Lesion
CT : Lesions in Medulla	No Lesion	No Lesion	No Lesion	No Lesion	No Lesion	Lesion
Gross Findings in Autopsy	Subdural Collection	Subdural Collection	Subdural Collection	Subdural Collection	Subdural Collection	Small Bifrontal Contusion
Microscopic Findings in Autopsy : Lesions in Thalamus	Hypoxic Changes	Hypoxic Changes	Hypoxic Changes	Hypoxic Changes	Hypoxic Changes	Microhemorrages
Microscopic Findings in Autopsy : Lesions in Corpus Callosum	Hypoxic Changes	Microhemorrages	Hypoxic Changes	Microhemorrages	Microhemorrages	Microhemorrages
Microscopic Findings in Autopsy : Lesions in Midbrain	Hypoxic Changes	Hypoxic Changes	Microhemorrages	Hypoxic Changes	Hypoxic Changes	Microhemorrages
Microscopic Findings in Autopsy : Lesions in Pons	Hypoxic Changes	Hypoxic Changes	Microhemorrages	Hypoxic Changes	Hypoxic Changes	Hypoxic Changes
Microscopic Findings in Autopsy : Lesions in Medulla	Hypoxic Changes	Hypoxic Changes	Hypoxic Changes	Hypoxic Changes	Hypoxic Changes	Hypoxic Changes

S.NO	24	25	26	27	28	29
Name	JAYAMANI	THANIGACHALAM	VIJAYAKUMAR	NAGAPPAN	AYYASAMY	ARUMUGAM
Age	50	55	32	85	60	23
Sex	F	M	M	M	M	M
IP No	22012	22197	22818	23237	26043	27260
Date of Trauma	01-Mar-15	01-Mar-15	02-Mar-15	02-Mar-15	06-Mar-15	10-Mar-15
Date of Admission	01-Mar-15	01-Mar-15	03-Mar-15	03-Mar-15	06-Mar-15	10-Mar-15
Expired date	03-Jan-15	04-Mar-15	09-Mar-15	17-Mar-15	25-Mar-15	12-Mar-15
Mode of Injury	RTA	RTA	RTA	RTA	RTA	RTA
H/o LOC	H/o LOC	H/o LOC	H/o LOC	H/o LOC	H/o LOC	H/o LOC
H/o Seizures	No H/o Seizures	H/o Seizures	No H/o Seizures	H/o Seizures	H/o Seizures	No H/o Seizures
H/o Vomiting	No H/o Vomiting	H/o Vomiting	No H/o Vomiting	H/o Vomiting	H/o Vomiting	No H/o Vomiting
H/o ENT Bleed	H/o ENT Bleed	No H/o ENT Bleed	H/o ENT Bleed	No H/o ENT Bleed	No H/o ENT Bleed	No H/o ENT Bleed
GCS	3 of 15	4 of 15	4 of 15	5 of 15	6 of 15	5 of 15
E	1	1	1	1	2	1
V	ET	ET	ET	ET	ET	ET
M	1	2	2	3	3	3
Pupil Size	4mm	4mm	3mm	3.5mm	3mm	3mm
Pupillary Reflex	Absent	Absent	Absent	Present	Present	Absent
DEM	Absent	Absent	Absent	Present	Present	Absent
Clinical Grade	2	3	3	3	3	2
Neurological Deficity	No Neurological Deficit	No Neurological Deficit	No Neurological Deficit	No Neurological Deficit	Relative Right Paucity	No Neurological Deficit
CT Grade	2	2	1	1	1	1
CT : Lesions in Thalamus	Lesion	Lesion	No Lesion	No Lesion	No Lesion	No Lesion
CT : Lesions in Corpus Callosum	Lesion	No Lesion	No Lesion	No Lesion	No Lesion	No Lesion
CT : Lesions in Midbrain	Lesion	No Lesion	No Lesion	No Lesion	No Lesion	No Lesion
CT : Lesions in Pons	Lesion	No Lesion	No Lesion	No Lesion	No Lesion	No Lesion
CT : Lesions in Medulla	Lesion	No Lesion	No Lesion	No Lesion	No Lesion	No Lesion
Gross Findings in Autopsy	Contused Brain	Right Temporal ICH	Subdural Collection	Subdural Collection	Subdural Collection	Subdural Collection
Microscopic Findings in Autopsy : Lesions in Thalamus	Microhemorrages	Microhemorrages	Hypoxic Changes	Hypoxic Changes	Hypoxic Changes	Microhemorrages
Microscopic Findings in Autopsy : Lesions in Corpus Callosum	Microhemorrages	Microhemorrages	White Matter Degeneration	Hypoxic Changes	White Matter Degeneration	Hypoxic Changes
Microscopic Findings in Autopsy : Lesions in Midbrain	Hypoxic Changes	Hypoxic Changes	White Matter Degeneration	White Matter Degeneration	Hypoxic Changes	Hypoxic Changes
Microscopic Findings in Autopsy : Lesions in Pons	Hypoxic Changes	Hypoxic Changes	White Matter Degeneration	White Matter Degeneration	Hypoxic Changes	Hypoxic Changes
Microscopic Findings in Autopsy : Lesions in Medulla	Hypoxic Changes	Hypoxic Changes	White Matter Degeneration	White Matter Degeneration	Hypoxic Changes	Hypoxic Changes

S.NO	30	31	32
Name	MALLIKA	BALAJI	RAO BAHADUR SUBBA
Age	50	28	67
Sex	F	M	M
IP No	27746	28105	30851
Date of Trauma	12-Mar-15	15-Mar-15	24-Mar-15
Date of Admission	13-Mar-15	16-Mar-15	24-Mar-15
Expired date	14-Mar-15	17-Mar-15	25-Mar-15
Mode of Injury	RTA	RTA	RTA
H/o LOC	H/o LOC	H/o LOC	H/o LOC
H/o Seizures	H/o Seizures	H/o Seizures	No H/o Seizures
H/o Vomiting	No H/o Vomiting	No H/o Vomiting	No H/o Vomiting
H/o ENT Bleed	H/o ENT Bleed	No H/o ENT Bleed	No H/o ENT Bleed
GCS	4 of 15	4 of 15	3 of 15
E	1	1	1
V	ET	ET	ET
M	2	2	1
Pupil Size	3mm	3mm	4mm
Pupillary Reflex	Absent	Absent	Absent
DEM	Absent	Absent	Absent
Clinical Grade	2	2	2
Neurological Deficity	No Neurological Deficit	No Neurological Deficit	No Neurological Deficit
CT Grade	1	1	1
CT : Lesions in Thalamus	No Lesion	No Lesion	No Lesion
CT : Lesions in Corpus Callosum	No Lesion	No Lesion	No Lesion
CT : Lesions in Midbrain	No Lesion	No Lesion	No Lesion
CT : Lesions in Pons	No Lesion	No Lesion	No Lesion
CT : Lesions in Medulla	No Lesion	Lesion	No Lesion
Gross Findings in Autopsy	Subdural Collection	Subdural Collection	Subdural Collection
Microscopic Findings in Autopsy : Lesions in Thalamus	Hypoxic Changes	Hypoxic Changes	Hypoxic Changes
Microscopic Findings in Autopsy : Lesions in Corpus Callosum	Hypoxic Changes	Hypoxic Changes	Microhemorrages
Microscopic Findings in Autopsy : Lesions in Midbrain	Hypoxic Changes	Hypoxic Changes	Hypoxic Changes
Microscopic Findings in Autopsy : Lesions in Pons	Hypoxic Changes	Hypoxic Changes	Hypoxic Changes
Microscopic Findings in Autopsy : Lesions in Medulla	Hypoxic Changes	Hypoxic Changes	Hypoxic Changes

PLAGIARISM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INTRODUCTION
The adage that the dead teach the unique cannot be more true than in severe head injury. Hence this study was taken up which analysis neurological deficits and death as the result of diffuse closed head trauma sustained from high-speed automobile accidents which are difficult and confusing to comprehend..
The long-term consequences from such diffuse inner cerebral trauma are still poorly defined. The diffuse degeneration of cerebral white matter is associated with sagittal and lateral acceleration with centroaxial trauma and has a different pathogenesis from outer focal head trauma, typified by subdural hematomas and coup injuries.
Unlike outer cerebral injury, over 50 percent of victims with
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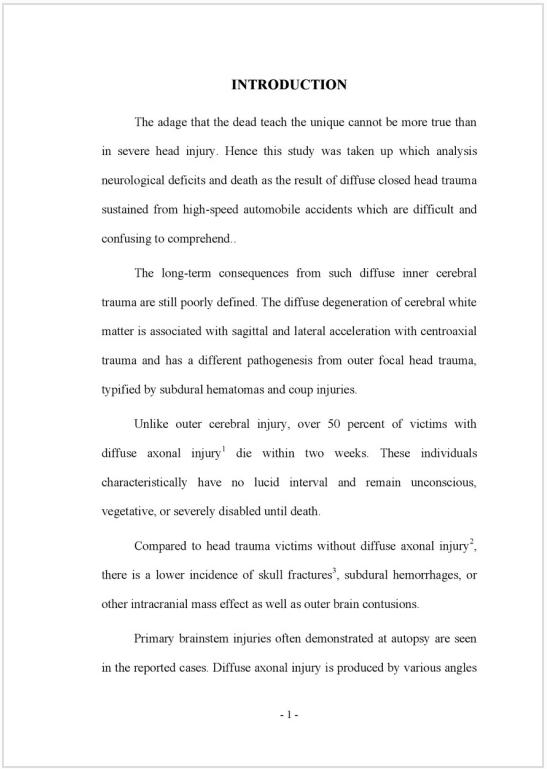

INTRODUCTION

The adage that the dead teach the unique cannot be more true than in severe head injury. Hence this study was taken up which analysis neurological deficits and death as the result of diffuse closed head trauma sustained from high-speed automobile accidents which are difficult and confusing to comprehend..

The long-term consequences from such diffuse inner cerebral trauma are still poorly defined. The diffuse degeneration of cerebral white matter is associated with sagittal and lateral acceleration with centroaxial trauma and has a different pathogenesis from outer focal head trauma, typified by subdural hematomas and coup injuries.

Unlike outer cerebral injury, over 50 percent of victims with diffuse axonal injury[1] die within two weeks. These individuals characteristically have no lucid interval and remain unconscious, vegetative, or severely disabled until death.

Compared to head trauma victims without diffuse axonal injury[2], there is a lower incidence of skull fractures[3], subdural hemorrhages, or other intracranial mass effect as well as outer brain contusions.

Primary brainstem injuries often demonstrated at autopsy are seen in the reported cases. Diffuse axonal injury is produced by various angles

- 1 -